TECHNICAL MEMORANDUM

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SUBJECT: Experimental Inter-comparison of Speciation Laboratories – 2010 Study

Introduction

This study was conducted as part of the EPA's quality assurance oversight for two air monitoring networks that include the Chemical Speciation Network (CSN) and the Interagency Monitoring of Protected Visual Environments (IMPROVE) Program. The purpose of this study was to evaluate specific laboratory performance at those laboratories that routinely analyze chemical speciation samples.

This study required each participating laboratory to analyze a set of blind Performance Testing (PT) filter samples. The PT samples were prepared at the National Air and Radiation Environmental Laboratory (NAREL) located in Montgomery, AL. NAREL was able to create replicate filter samples for this study by using collocated Met One speciation samplers. The collocated samplers were programmed to collect $PM_{2.5}$ from the Montgomery air and simultaneously load several filters during each collection event. A sufficient number of replicates were prepared so that each laboratory could receive the following set of PT samples.

- Gravimetric Mass Analysis – ten Teflon® filter samples and two metallic weights
- Ion Chromatography (IC) Analysis – six Nylon® filter samples or six Teflon® filter samples
- Carbon by Thermal Optical Analysis (TOA) – six quartz filter samples
- Elemental analysis by X-Ray Fluorescence (XRF) – six 47-mm or 25-mm Teflon® filter samples

Detailed instructions for analyzing and reporting the PT samples were provided by NAREL. This report will compare and discuss the analytical results received from all of the laboratories. Some of the laboratories received a full set of PT samples, and some received a partial set due to limitations that will be explained later in the appropriate section of this report. Table 1 identifies all of the laboratories along with their level of participation.

Table 1. List of Participating Laboratories

Laboratory	Location	Analyses Reported
California Air Resources Board (CARB)	Sacramento, CA	Gravimetric mass IC analysis, Nylon® filters TOA carbon, IMPROVE_A method Elements by XRF (47-mm filters)
Desert Research Institute (DRI)	Reno, NV	Gravimetric mass IC analysis, Teflon® filters IC analysis, Nylon® filters TOA carbon, IMPROVE_A method Elements by XRF (25- & 47-mm filters)
Oregon Dept. of Environmental Quality (ODEQ)	Portland, OR	Gravimetric mass IC analysis, Nylon® filters Elements by XRF (47-mm filters)
Research Triangle Institute (RTI)	Research Triangle Park, NC	Gravimetric mass IC analysis, Nylon® filters TOA carbon, IMPROVE_A method TOA carbon, CSN method Elements by XRF (25- & 47-mm filters)
South Coast Air Quality Management District (AQMD)	Diamond Bar, CA	Gravimetric mass IC analysis, Nylon® filters TOA carbon, IMPROVE_A method Elements by XRF (47-mm filters)
University of California / Davis (UCD)	Davis, CA	Gravimetric mass Elements by XRF (25- & 47-mm filters)
EPA's National Air and Radiation Environmental Laboratory (NAREL)	Montgomery, AL	Gravimetric mass IC analysis, Teflon® filters IC analysis, Nylon® filters TOA carbon, IMPROVE_A method TOA carbon, CSN method

Mass determination typically proceeds by weighing the Teflon® collection filter before and after the sampling event. The amount of Particulate Matter ($PM_{2.5}$) captured onto the surface of the filter can be calculated by a simple subtraction of the tare mass from the loaded filter mass. Each speciation laboratory routinely provides clean PRE-weighed air filters to the supported field sites. At the field site, an approved sampling device must be used to deposit the $PM_{2.5}$ onto the collection filter. The loaded filter is returned to the originating laboratory where the gravimetric analysis is completed by POST-weighing the filter. After the gravimetric measurements are complete, the Teflon® filter is examined further using XRF to determine the elemental composition of the filter deposit. Usually XRF is the final analysis of the Teflon® filter after which the filter is placed into an archive for storage, but in some cases the filter is subjected to one more [final] analysis to determine the ions present in the filter deposit. If the Teflon® filter is examined for ions, it must be extracted, and the extract is subsequently analyzed using ion chromatography.

Most of the speciation laboratories provide clean Nylon® filters to the field sites. It is usually the Nylon® filter that is used to capture $PM_{2.5}$ for subsequent IC analysis. After the loaded filter is returned to the laboratory, the IC analysis typically proceeds by first extracting the filter using an appropriate solvent. The extract must be analyzed using an IC instrument that is optimized to determine the ions of interest. Target anions and target cations must be analyzed on separate IC instruments.

The laboratories also provide clean quartz filters to the supported field sites. The quartz filter is used to capture $PM_{2.5}$ for subsequent carbon analysis. A thermal/optical analysis (TOA) is performed at the laboratory to determine the carbon present on the quartz filter. A carefully measured portion of the quartz filter is placed into a special oven equipped to shine a laser at the sample. The TOA technique requires heating the quartz filter material to release captured $PM_{2.5}$. Carbon components released from the filter are catalytically converted to methane and measured by a flame ionization detector (FID) positioned at the end of the sample train. A thermogram produced by the analysis contains signals from the FID and from the laser. Interpretation of the thermogram provides results for the organic carbon (OC) and the elemental carbon (EC) the sum of which represents the total carbon (TC) present in the sample. Two slightly different TOA methods were used to analyze samples during this study. A more detailed description of each TOA method will be provided later in this report.

Gravimetric Analysis

Ten new filters and two metallic transfer weights were supplied by NAREL to each laboratory for this study. These samples were placed into individual Petri slides and shipped by overnight mail to the receiving lab with instructions to PRE-weigh each filter and metallic weight using the local standard procedures. After tare measurements were completed at the receiving lab, the filters and metallic weights were returned to Montgomery and immediately placed into the weighing chamber at NAREL for equilibration and determination of a stable tare mass. Shortly after NAREL's tare measurements were complete, some of the filters were loaded with $PM_{2.5}$ captured from the Montgomery air. Collocated Met One SuperSASS air samplers were used to load seven of the filters in each sample set according to the sampling schedule presented in table 2.

Table 2. Sampling Schedule for Gravimetric PT Filters

Filter ID	Serial Number	Sample Start	Event Duration	Receiving Lab
T10-13366	T8085651	10-Dec-2010	60-hour	CARB
T10-13367	T8085652	10-Dec-2010	60-hour	CARB
T10-13368	T8085653	13-Dec-2010	24-hour	CARB
T10-13369	T8085654	13-Dec-2010	24-hour	CARB
T10-13370	T8085655	14-Dec-2010	20-hour	CARB
T10-13371	T8085656	14-Dec-2010	20-hour	CARB
T10-13372	T8085657	15-Dec-2010	46-hour	CARB
T10-13376	T8085661	10-Dec-2010	60-hour	DRI
T10-13377	T8085662	10-Dec-2010	60-hour	DRI
T10-13378	T8085663	13-Dec-2010	24-hour	DRI
T10-13379	T8085664	13-Dec-2010	24-hour	DRI
T10-13380	T8085665	14-Dec-2010	20-hour	DRI
T10-13381	T8085666	14-Dec-2010	20-hour	DRI
T10-13382	T8085667	15-Dec-2010	46-hour	DRI
T10-13386	T8085671	10-Dec-2010	60-hour	ODEQ
T10-13387	T8085672	10-Dec-2010	60-hour	ODEQ
T10-13388	T8085673	13-Dec-2010	24-hour	ODEQ
T10-13389	T8085674	13-Dec-2010	24-hour	ODEQ

Filter ID	Serial Number	Sample Start	Event Duration	Receiving Lab
T10-13390	T8085675	14-Dec-2010	20-hour	ODEQ
T10-13391	T8085676	14-Dec-2010	20-hour	ODEQ
T10-13392	T8085677	15-Dec-2010	46-hour	ODEQ
T10-13396	T8085681	10-Dec-2010	60-hour	RTI
T10-13397	T8085682	10-Dec-2010	60-hour	RTI
T10-13398	T8085683	13-Dec-2010	24-hour	RTI
T10-13399	T8085684	13-Dec-2010	24-hour	RTI
T10-13400	T8085685	14-Dec-2010	20-hour	RTI
T10-13401	T8085686	14-Dec-2010	20-hour	RTI
T10-13402	T8085687	15-Dec-2010	46-hour	RTI
T10-13406	T8085691	10-Dec-2010	60-hour	AQMD
T10-13407	T8085692	10-Dec-2010	60-hour	AQMD
T10-13408	T8085693	13-Dec-2010	24-hour	AQMD
T10-13409	T8085694	13-Dec-2010	24-hour	AQMD
T10-13410	T8085695	14-Dec-2010	20-hour	AQMD
T10-13411	T8085696	14-Dec-2010	20-hour	AQMD
T10-13412	T8085697	15-Dec-2010	46-hour	AQMD
T10-13416	none	10-Dec-2010	60-hour	UCD
T10-13417	none	10-Dec-2010	60-hour	UCD
T10-13418	none	13-Dec-2010	24-hour	UCD
T10-13419	none	13-Dec-2010	24-hour	UCD
T10-13420	none	14-Dec-2010	20-hour	UCD
T10-13421	none	14-Dec-2010	20-hour	UCD
T10-13422	none	15-Dec-2010	46-hour	UCD

Table 2 shows forty-two filters that were loaded during four separate collection events. A sufficient number of replicates were prepared during each event such that each lab could be provided with an almost identical set of loaded filters. For example, twelve replicates were created during a 60-hour collection event that started on December 10, and two of these replicates were submitted to each lab for analysis. Similarly, twelve replicates were created during a 24-hour collection event that started on December 13, and two of these replicates were submitted to each lab for analysis. Table 2 does not list all of the filters that were PRE-weighed at the participating labs. Three of the ten filters that were PRE-weighed at each lab were not scheduled for loading because they were used as filter blanks for this study.

Following sample collection, the filters and the metallic weights were returned to the weighing chamber at NAREL and POST-weighed multiple times over the course of several days to demonstrate a stable final mass. Finally, the filters and metallic weights were placed into small Igloo® coolers with ice substitute and shipped back to the participating labs for POST-weighing. It is worth mentioning that the metallic weights were included in this study because they are usually less susceptible to weighing errors due to factors such as electrical static and volatility of filter constituents.

Gravimetric Results

The results from this study are summarized in figure 1. The critical information needed by the program is the mass of $PM_{2.5}$ deposited onto the surface of a collection filter, and therefore, $PM_{2.5}$ capture is plotted in figure 1 for the seven loaded filters, three travel blanks, and two metallic weights.

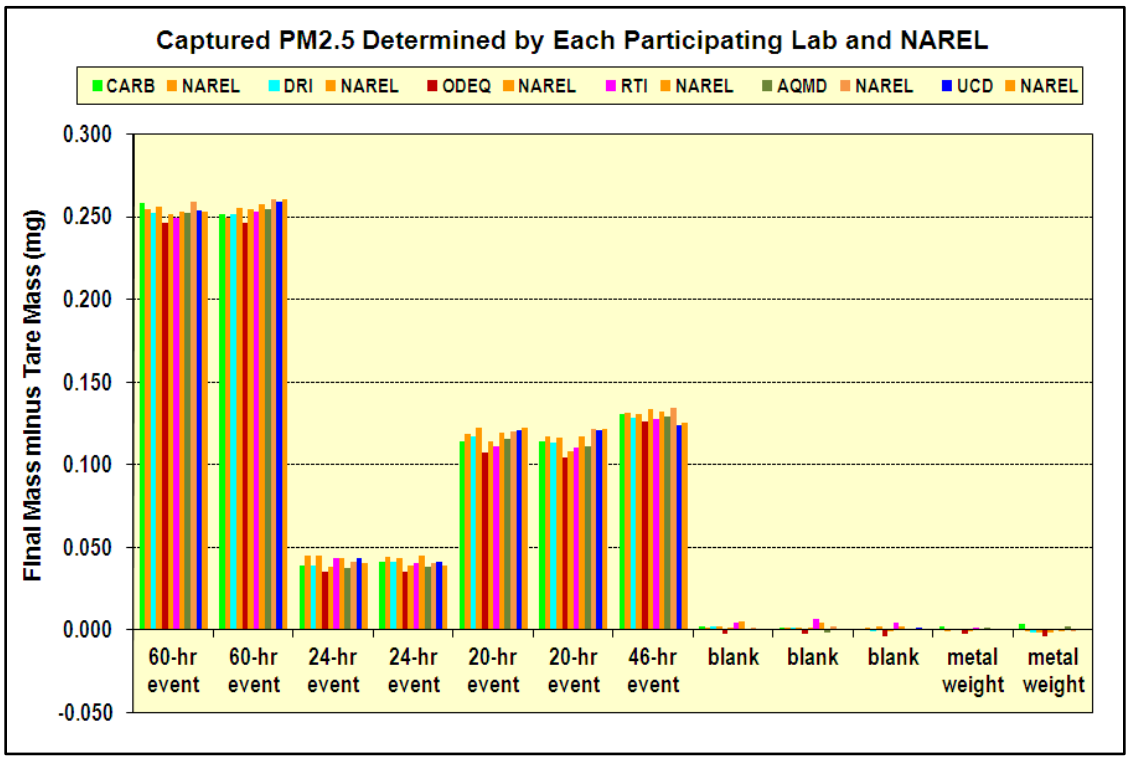
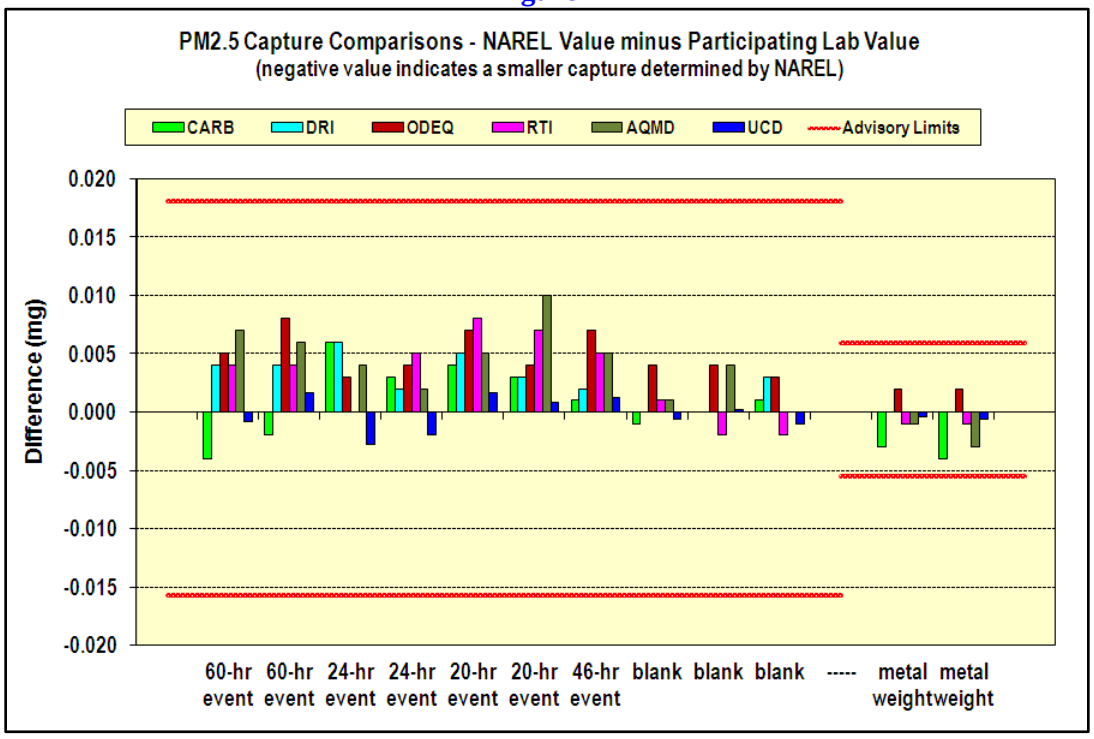


Figure 1

Figure 2 presents the inter-laboratory differences along with advisory limits. Inter-laboratory differences were calculated by subtracting the $PM_{2.5}$ capture value determined at each speciation lab from the capture value determined at NAREL. Notice that a negative bar on the figure 2 graph represents a smaller $PM_{2.5}$ capture value determined at NAREL. The 3-sigma advisory limits were derived from all of the gravimetric PT studies administered by NAREL during the past several years. Performance was good for all of the participating labs.

Figure 2



The raw data reported from all laboratories have been tabulated for easy viewing. At the end of this report, table 10 contains the tare weight, the final loaded weight, and the calculated $PM_{2.5}$ capture for each sample. Table 10 also contains the calculated inter-laboratory difference for measuring the $PM_{2.5}$ capture which is graphed in figure 2.

All of the participating labs have an SOP for measuring the gravimetric mass of $PM_{2.5}$ filter samples. Most of the SOP's are currently available on the web for easy viewing (see reference 1 through 5).

IC Analysis

This study included the analysis of selected ions using three slightly different IC methods. Six labs analyzed a set of Nylon® filters using the CSN method, two labs analyzed a set of Teflon® filters using the CSN method, and finally two labs analyzed a set of Nylon® filters using the IMPROVE method. To avoid confusion about the methods identified here, it should be stated that the CSN method was previously referred to as the Speciation Trends Network (STN) method. CSN is used in this report to be consistent with the language used in recent EPA contracts that support the chemical speciation network which includes approximately 200 field sites.

NAREL provided each lab with a set of six filters for each method tested. Each sample set contained two blank filters and four filters that were loaded with $PM_{2.5}$ collected from the Montgomery air. Collocated Met One SuperSASS air samplers were used to load filters and create replicates in each sample set according the sampling schedule presented in table 3.

Table 3. Sampling Schedule for Ion Chromatography PT Filters

Filter ID	Filter Medium	Sample Start	Event Duration	Receiving Lab	Method
N10-13438	Nylon®	27-Dec-2009	160-hour	CARB	CSN
N10-13439	Nylon®	27-Dec-2009	160-hour	CARB	CSN
N10-13452	Nylon®	12-May-2010	144-hour	CARB	CSN
N10-13453	Nylon®	12-May-2010	144-hour	CARB	CSN
N10-13440	Nylon®	27-Dec-2009	160-hour	DRI	CSN
N10-13441	Nylon®	27-Dec-2009	160-hour	DRI	CSN
N10-13454	Nylon®	12-May-2010	144-hour	DRI	CSN
N10-13455	Nylon®	12-May-2010	144-hour	DRI	CSN
N10-13442	Nylon®	27-Dec-2009	160-hour	ODEQ	CSN
N10-13443	Nylon®	27-Dec-2009	160-hour	ODEQ	CSN
N10-13456	Nylon®	12-May-2010	144-hour	ODEQ	CSN
N10-13457	Nylon®	12-May-2010	144-hour	ODEQ	CSN
N10-13444	Nylon®	27-Dec-2009	160-hour	RTI	CSN
N10-13445	Nylon®	27-Dec-2009	160-hour	RTI	CSN
N10-13458	Nylon®	12-May-2010	144-hour	RTI	CSN
N10-13459	Nylon®	12-May-2010	144-hour	RTI	CSN
N10-13446	Nylon®	27-Dec-2009	160-hour	AQMD	CSN
N10-13447	Nylon®	27-Dec-2009	160-hour	AQMD	CSN
N10-13460	Nylon®	12-May-2010	144-hour	AQMD	CSN
N10-13461	Nylon®	12-May-2010	144-hour	AQMD	CSN
N10-13448	Nylon®	27-Dec-2009	160-hour	NAREL	CSN
N10-13449	Nylon®	27-Dec-2009	160-hour	NAREL	CSN
N10-13462	Nylon®	12-May-2010	144-hour	NAREL	CSN
N10-13463	Nylon®	12-May-2010	144-hour	NAREL	CSN

Filter ID	Filter Medium	Sample Start	Event Duration	Receiving Lab	Method
T10-13472	Teflon®	14-Jan-2010	227-hour	DRI	CSN
T10-13473	Teflon®	14-Jan-2010	227-hour	DRI	CSN
T10-13484	Teflon®	19-May-2010	144-hour	DRI	CSN
T10-13485	Teflon®	19-May-2010	144-hour	DRI	CSN
T10-13476	Teflon®	14-Jan-2010	227-hour	NAREL	CSN
T10-13477	Teflon®	14-Jan-2010	227-hour	NAREL	CSN
T10-13486	Teflon®	19-May-2010	144-hour	NAREL	CSN
T10-13487	Teflon®	19-May-2010	144-hour	NAREL	CSN
N10-13466	Nylon®	14-Jan-2010	227-hour	RTI	IMPROVE
N10-13467	Nylon®	14-Jan-2010	227-hour	RTI	IMPROVE
N10-13478	Nylon®	19-May-2010	144-hour	RTI	IMPROVE
N10-13479	Nylon®	19-May-2010	144-hour	RTI	IMPROVE
N10-13468	Nylon®	14-Jan-2010	227-hour	NAREL	IMPROVE
N10-13469	Nylon®	14-Jan-2010	227-hour	NAREL	IMPROVE
N10-13480	Nylon®	19-May-2010	144-hour	NAREL	IMPROVE
N10-13481	Nylon®	19-May-2010	144-hour	NAREL	IMPROVE

Table 3 shows forty filters that were loaded during four separate collection events. Several replicates were prepared during each event, creating a pool of replicates which were available for distribution among the participating labs. Careful inspection of table 3 will show that two replicates from each event were distributed to each participating lab for analysis. The collection times used for this study were significantly longer than the usual twenty-four hours to boost the amount of $PM_{2.5}$ collected and raise the level of most analytes to above the detection threshold. Table 3 does not list the filter blanks that were provided to each lab.

Filter sets were provided to the participating labs with instructions to use the local standard procedures, as closely as possible, for the extraction and the IC analysis. No information was given to the labs about the history of the individual filters. The results were reported for each sample based upon the amount of analyte present on the filter (µg/filter). All of the participating labs have an SOP for analyzing $PM_{2.5}$ filter samples by IC. Most of the SOP's are currently available on the web for easy viewing (see reference 6 through 16).

IC Results

Results from the analysis of twenty-four Nylon® filters using the CSN method are presented as bar graphs in figures 3 and 4. These results were derived from analyzing the replicates sampled on December 27 and May 12. Nitrate, sulfate, and ammonium were the most abundant analytes captured from the Montgomery air, and these mid-level ions are plotted together in figure 3. Each cluster of bars in the graph is labeled with the ion reported, but the individual samples within each cluster are not identified. It is important to understand that the replicate samples within each cluster were consistently arranged, from left to right, in the same order. Reasonably good agreement can be seen in figure 3 for all of the mid-level ions.

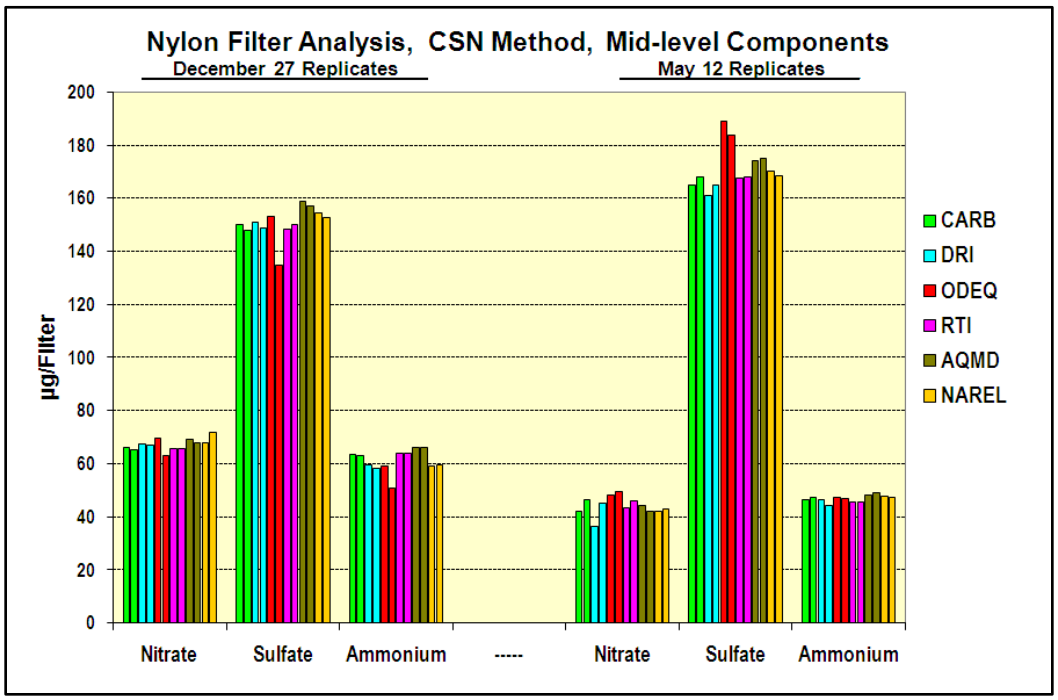
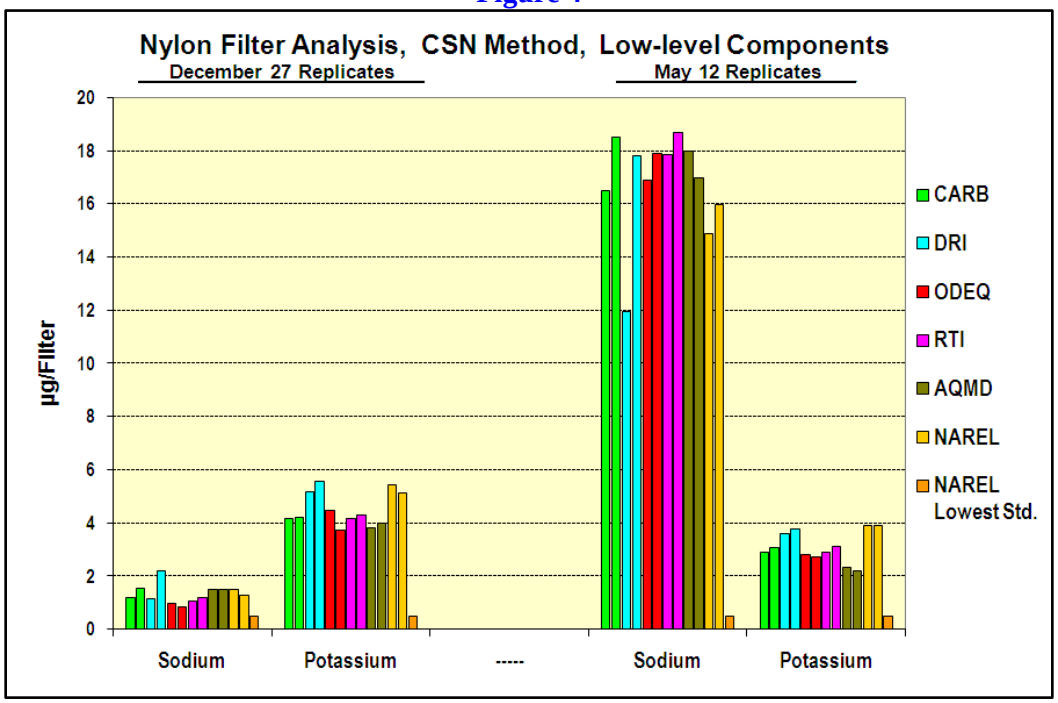


Figure 3

Sodium and potassium were present in the air at relatively low levels, and these ions are plotted in figure 4. Since figure 4 shows the low-level components, an extra bar has been added that represents the lowest calibration standard analyzed at NAREL. The lowest calibration standard is a good estimate of the practical quantification limit for the analysis.

One of the sodium values reported by DRI for the May 12 replicates is noticeably smaller than the other reported values. Even though an explanation for this low value could not be found, it was noted that replicate determinations performed at DRI for each filter extract had produced excellent agreement, and less than 2 % difference was observed for duplicate determinations within the same analytical sequence.

Figure 4



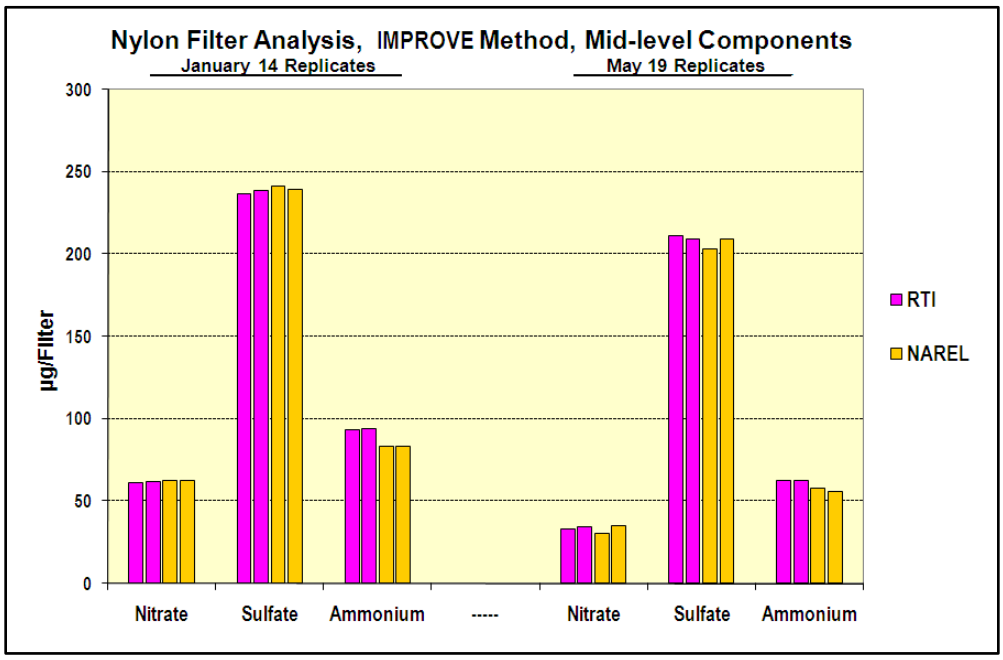
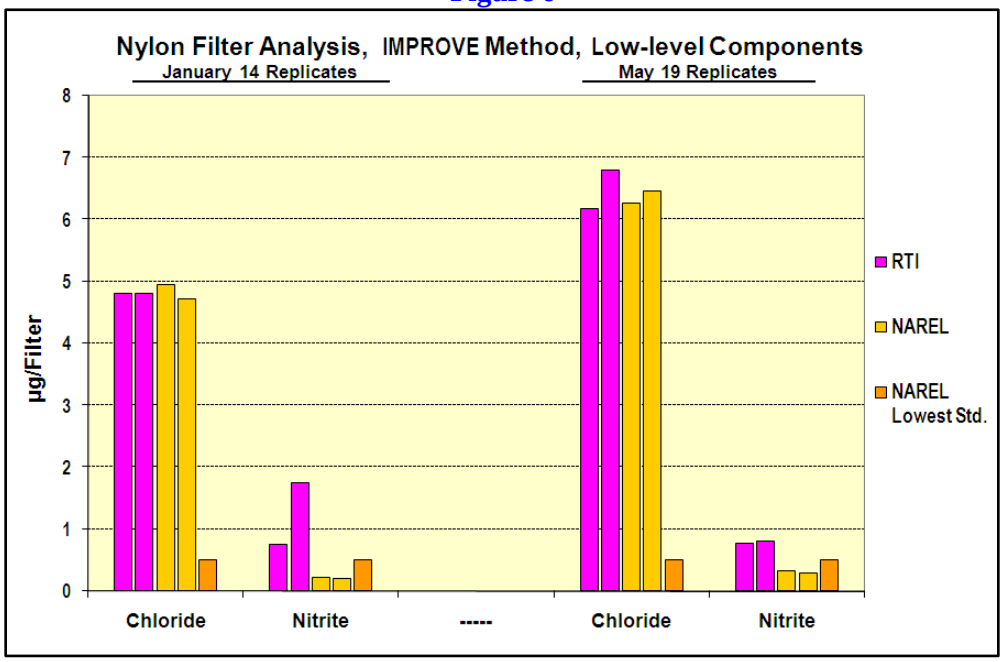


Figure 5

Figures 5 and 6 show more results for Nylon® filters using the IMPROVE method. Results are presented from two labs that analyzed replicates sampled on January 14 and May 19. Nylon filters are routinely analyzed at RTI using the IMPROVE method which is slightly different from the CSN method with respect to the extraction procedure and the list of reported ions. Once again the mid-level components and the low-level components are presented in separate graphs. The mid-level ions are shown in figure 5. Two new low-level ions are shown in figure 6. Chloride and nitrite are routinely determined using the IMPROVE method, even though they are not reported for the CSN method. Note also that potassium and sodium are not reported for the IMPROVE method.

Figures 5 and 6 show good agreement between labs for all of the IMPROVE ions except nitrite. Low level nitrite is often observed from blanks. Filter blank results from this study are available in table 11 at the end of this report.

Figure 6



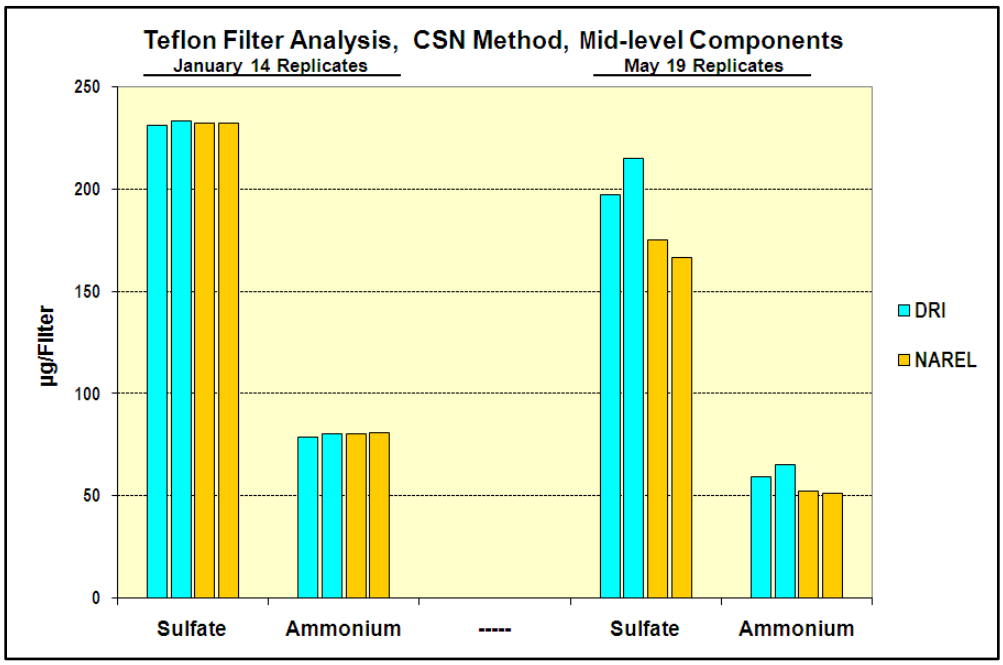
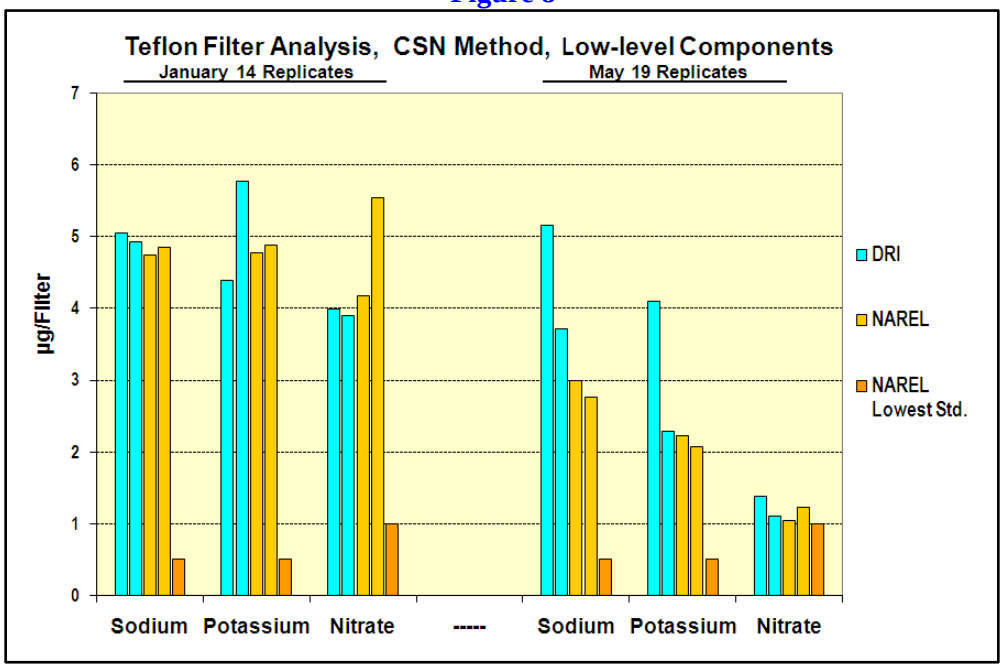


Figure 7

According to table 3, both Nylon® and Teflon® filters were loaded during the January 14 and May 19 sampling events. Results from the Nylon® filters were presented previously in figures 5 and 6. Results from the Teflon® filters are presented here in figures 7 and 8. Notice that nitrate is not included as a mid-level ion in figure 7. This is not surprising since the lower nitrate values reported from the Teflon® filters are due to a known sampling artifact. The nitrate values shown in figure 5 from the Nylon® filters are more than ten times higher than the nitrate values from the Teflon® filters shown in figure 8.

Figures 7 and 8 show reasonably good precision for the January 14 replicates, but worse agreement is observed between labs for the May 19 replicates.

Figure 8



Carbon Analysis

This study included the Thermal-Optical Analysis (TOA) of quartz fiber filters to determine the amount of carbon present in captured $PM_{2.5}$. NAREL provided each participating laboratory with a set of six 47-mm filters. Each sample set contained two blank filters and four filters that were loaded with $PM_{2.5}$ collected from the Montgomery air. Collocated Met One SuperSASS air samplers were used to load filters and create replicates in each sample set according to the sampling schedule presented in table 4.

Table 4. Sampling Schedule for TOA Carbon PT Filters

Filter ID	Filter Medium	Sample Start	Event Duration	Receiving Lab	Method(s)
Q10-13510	quartz	07-Dec-2009	272-hour	CARB	IMPROVE_A
Q10-13511	quartz	07-Dec-2009	272-hour	CARB	IMPROVE_A
Q10-13522	quartz	27-Apr-2010	226-hour	CARB	IMPROVE_A
Q10-13523	quartz	27-Apr-2010	226-hour	CARB	IMPROVE_A
Q10-13512	quartz	07-Dec-2009	272-hour	DRI	IMPROVE_A
Q10-13513	quartz	07-Dec-2009	272-hour	DRI	IMPROVE_A
Q10-13524	quartz	27-Apr-2010	226-hour	DRI	IMPROVE_A
Q10-13525	quartz	27-Apr-2010	226-hour	DRI	IMPROVE_A
Q10-13514	quartz	07-Dec-2009	272-hour	RTI	IMPROVE_A and CSN
Q10-13515	quartz	07-Dec-2009	272-hour	RTI	IMPROVE_A and CSN
Q10-13526	quartz	27-Apr-2010	226-hour	RTI	IMPROVE_A and CSN
Q10-13527	quartz	27-Apr-2010	226-hour	RTI	IMPROVE_A and CSN
Q10-13516	quartz	07-Dec-2009	272-hour	AQMD	IMPROVE_A
Q10-13517	quartz	07-Dec-2009	272-hour	AQMD	IMPROVE_A
Q10-13528	quartz	27-Apr-2010	226-hour	AQMD	IMPROVE_A
Q10-13529	quartz	27-Apr-2010	226-hour	AQMD	IMPROVE_A
Q10-13518	quartz	07-Dec-2009	272-hour	NAREL	IMPROVE_A and CSN
Q10-13519	quartz	07-Dec-2009	272-hour	NAREL	IMPROVE_A and CSN
Q10-13530	quartz	27-Apr-2010	226-hour	NAREL	IMPROVE_A and CSN
Q10-13531	quartz	27-Apr-2010	226-hour	NAREL	IMPROVE_A and CSN

Table 4 shows twenty filters that were loaded during two separate collection events. A sufficient number of replicates were prepared during each event such that each participating lab was provided with an almost identical set of loaded filters. Ten replicates were created during the 272-hour winter event that started on December 7, and two of these replicates were submitted to each lab for analysis. Likewise, ten replicates were created during the 226-hour spring event that started on April 27, and two of these replicates were submitted to each lab for analysis. The collection times used for this study were significantly longer than the normal 24-hours to boost the amount of elemental carbon deposited on the filter. Table 4 does not list the two filter blanks that were provided to each participating lab.

A filter set was provided to each lab with instructions to use local standard procedures, as closely as possible, for the analysis. No information was given to the participating labs about the history of the individual filters. ODEQ did not participate in this part of the study because their quartz filters are shipped to DRI for analysis. The DRI and RTI labs are set up to analyze a large volume of samples and routinely operate several TOA instruments. Both DRI and RTI were able to analyze each filter at least twice using more than one instrument. RTI and NAREL also reported results using more than one TOA method. The results were reported for each sample based upon the amount of carbon per square centimeter of deposit area (µg C/cm^2).

According to table 4, two different TOA methods were used to report results: the IMPROVE_A method and the CSN method. To avoid confusion, it should be stated again that the CSN method was previously referred to as the Speciation Trends Network (STN) method. CSN is used in this report to be consistent with the language used in recent EPA contracts. It may be useful to briefly explain the major differences between the IMPROVE_A and the CSN methods. Table 5 shows the temperature protocol that is used by each method.

Table 5. Comparison of Temperature Protocols for Two TOA Methods

IMPROVE_A Method TOR Analysis	CSN Method TOT Analysis	Carrier Gas	Carbon Fraction*
heater off (90s)	heater off (90s)	He Purge	-----
140°C (150-580s)	310°C (60s)	He	OC1
280°C (150-580s)	480°C (60s)	He	OC2
480°C (150-580s)	615°C (60s)	He	OC3
580°C (150-580s)	900°C (90s)	He	OC4
-----	heater off (40s)**	He	
580°C (150-580s)	600°C (35s)	He/O_2	EC1
740°C (150-580s)	675°C (45s)	He/O_2	EC2
840°C (150-580s)	750°C (45s)	He/O_2	EC3
-----	825°C (45s)	He/O_2	
-----	920°C (120s)	He/O_2	
heater off (200s)**	heater off (110s)**	He/O_2 + IS	

**** The Carbon fractions are not consistently defined between the two different methods. See text for explanation.***
***** The "heater off" times are approximate and may have varied slightly among instruments during this study.***

Beyond the thermal protocols listed in table 5, each TOA method is further defined by the way optical measurements are made and utilized to calculate carbon fractions. For example, the optical measurements are used to distinguish the elemental carbon (EC) from the organic carbon (OC) present in the sample. In fact we shall see, all of the carbon fractions have a functional definition that depends upon the method of analysis.

All of the instruments used for this study are equipped with a small tubular quartz oven and a laser/diode system. The sample analysis begins by placing a carefully measured [punched] segment of the filter sample into the oven directly in the path of the laser. A purge gas removes air from the oven and surrounds the sample with a stream of pure helium before the heating and data acquisition begin. Light from the laser will interact with the sample during the analysis. A diode detector can be positioned to measure the light transmitted through the sample, and this configuration is needed for a TOT (thermal optical transmittance) analysis. A diode can also be positioned to measure the reflected light, and this configuration is needed for a TOR (thermal optical reflectance) analysis. As the sample segment is heated and the pure helium phase of the analysis proceeds, some of the organic carbon may char to form a darker pyrolized carbon (PyrolC). All of the methods in this study use either TOT or TOR to evaluate the PyrolC. Three different instruments were used for this study. The older Sunset [single mode] instruments are equipped with only one diode detector configured for the TOT analysis. The DRI Model 2001 instruments and the Sunset Dual Mode instruments are newer designs capable of measuring the transmitted and the reflected light simultaneously. These newer instruments provide more optical information since each instrument is equipped with two diode detectors giving the user a choice of the TOT or the TOR analysis. Table 6 shows specifically how the different instruments were used for analyzing the samples in this study.

Table 6. Summary of Report Packages for the TOA Analyses

Temperature Protocol	Optical Analysis	Instrument Model	Specific Instrument Reporting	Parameters Reported	Report Package Count
IMPROVE_A	TOR	DRI Model 2001	CARB Instr. #1	OC, EC, TC, OCsub, ECsub	1
			DRI Instr. #6	OC, EC, TC, OCsub, ECsub	2
			DRI Instr. #13	OC, EC, TC, OCsub, ECsub	3
			RTI Instr. #1	OC, EC, TC, OCsub, ECsub	4
			AQMD Instr. #3	OC, EC, TC, OCsub, ECsub	5
		Sunset (dual-mode)	RTI Instr. T	OC, EC, TC, OCsub, ECsub	6
			NAREL Instr. #2	OC, EC, TC, OCsub, ECsub	7
CSN	TOT	Sunset (dual-mode)	RTI Instr. T	OC, EC, TC, OCsub	8
			RTI Instr. R	OC, EC, TC, OCsub	9
		Sunset (single-mode)	NAREL Instr. #1	OC, EC, TC, OCsub	10

All of the instruments in this study operate by heating a punched segment of the sample in the presence of a controlled carrier gas. Any carbonaceous material released from the quartz filter segment is swept through a series of zones that rapidly convert the released carbon to methane which is measured by a Flame Ionization Detector (FID) positioned at the end of the sample train. During the first [non-oxidizing] stage of the analysis, the carrier gas is pure helium. Oxygen is added to the carrier during the second stage of the analysis which is designed to remove any remaining carbonaceous material from the quartz residue. Most of the OC is released during the first stage of the analysis, but the EC and any PyrolC that may have formed are more difficult to volatilize, and they are expected to release during the second stage of the analysis. A known mass of methane is injected through the oven at the end of the analysis to serve as an internal standard. Signals from the FID and from the laser may be plotted along a time axis to construct a thermogram. An example thermogram is shown in figure 9.

Figure 9

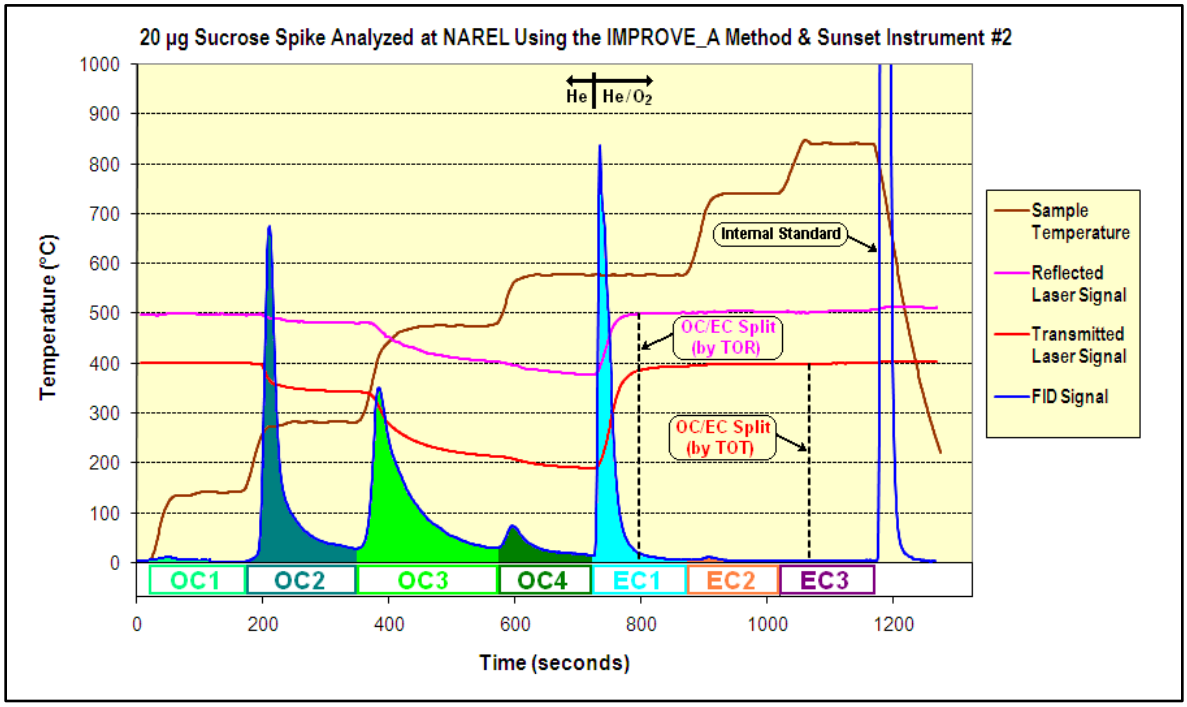


Figure 9 is a thermogram of a sucrose spike which was analyzed at NAREL using the IMPROVE_A heating profile. Sucrose is a good calibration check sample because it has a strong tendency to char creating PyrolC during the analysis, yet it contains no EC. Figure 9 shows suppression of both laser signals as char forms during the first stage of the analysis. Both laser signals recover during the second stage of the analysis as the char is released from the sample. It is normal for the reflected laser signal to recover slightly ahead of the transmitted signal. The FID signal represents all of the carbon released from the sample as well as the internal standard injected near the end of the run.

Raw data in the thermogram must be evaluated to determine those carbon fractions that will be reported for the sample. All of the participating labs report the Total Carbon (TC) as the sum of the OC and the EC fractions.

$$TC = OC + EC \qquad \textbf{Equation 1}$$

Furthermore, OC and EC subfractions may be reported to offer a more detailed fingerprint of the sample. For example, figure 9 shows seven subfractions that are defined by the IMPROVE_A method which also may be used to calculate the total carbon.

$$TC = OC1 + OC2 + OC3 + OC4 + EC1 + EC2 + EC3 \qquad \textbf{Equation 2}$$

Notice that equation 1 requires knowledge of the OC/EC split point, but equation 2 does not. All of the seven subfractions identified in figure 9 and equation 2 are related to the heating profile (see table 5). For example, notice that the IMPROVE_A method heats the sample at three different temperatures during the final [oxidizing] stage of the analysis. EC1 is defined by the method as that carbon released from the sample at 580 ºC after oxygen has been added to the carrier gas. And similarly, EC2 and EC3 represent the carbon released at 740 ºC and 840 ºC respectively (see table 5). It should be obvious from these examples that the heating requirements and the precision of the method will likely affect the amount of carbon assigned to each subfraction.

Clearly, all of the carbon fractions are defined by the method. The method controls the instrument during data acquisition and also controls the calculation of results from the raw data. Let us take a closer look at how results are calculated from the raw data. A "split point" must be established in each thermogram that separates the OC and the EC. The laser signal must be examined as part of determining the split point. If any of the original OC chars during the first stage of the analysis, the laser signal will decrease from its initial value, and will not recover until later in the run. The point at which the recovering laser signal reaches its initial value is usually the split point. Some samples do not form char, however, and the laser signal does not decrease and fall below its initial value. In this case, the OC/EC split is usually assigned to that point at which the oxygen valve opens for the second phase of the analysis to begin. All of the instruments follow these general rules.

The IMPROVE_A and the CSN methods use different heating protocols, and furthermore, use different rules for calculating some of the subfractions. EPA has been aware for several years that different TOA methods give different results for carbon fractions. Consequently EPA decided to migrate to a single TOA carbon method. The three-year implementation plan included switching to a new air monitor, the URG 3000N, installed at the CSN field sites. The URG-3000N is similar to the air monitors used for the IMPROVE network. The IMPROVE_A TOR method has replaced the CSN TOT method at those field sites that received a URG-3000N monitor. Currently, DRI is subcontracted by RTI to analyze samples requiring the IMPROVE_A analysis for the CSN contract. More information regarding the transition and implementation is available at the following web site.

http://www.epa.gov/ttn/amtic/specurg3000.html

All of the results presented in this report have been identified with the instrument that performed the analysis as well as the thermal protocol and optical configuration that was used. All of the participating labs have an SOP for the TOA method(s) used at their laboratory. Many SOP's are currently available on the web (see reference 17 through 22).

Carbon Results

Results from the analysis of replicate quartz filters using either the IMPROVE_A method are presented below as bar graphs. Notice that the height of each bar within a graph represents the total carbon reported for the filter, and each bar in the graph is labeled with the instrument number, the lab, and the last three digits of the sample number.

Figure 10

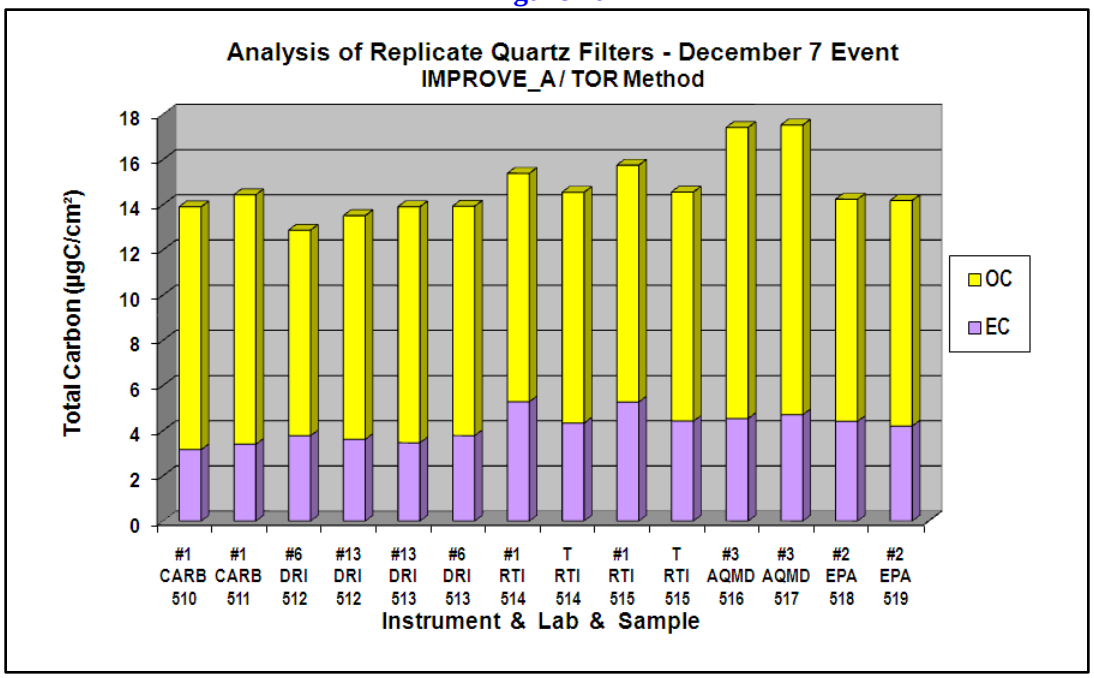
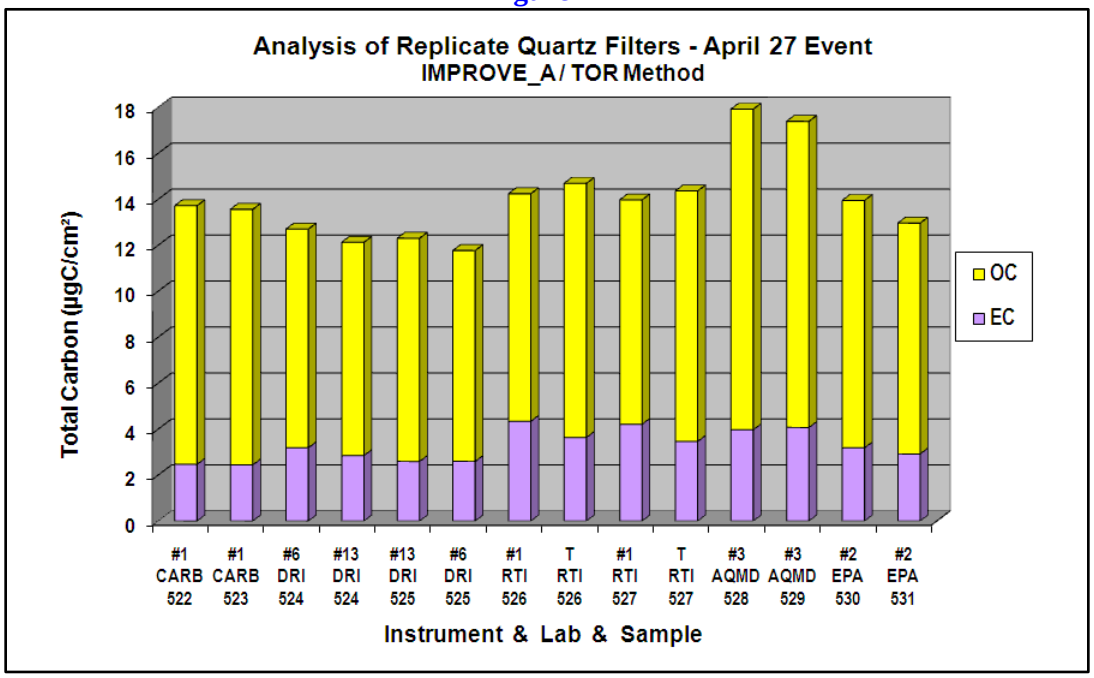


Figure 10 shows results from replicates that were created on December 7, and figure 11 shows the results from replicates created on April 27. The bar segments show the OC and EC components of the total carbon but do not show the more detailed fractions. Notice that each filter submitted to DRI and RTI was analyzed twice using different instruments.

Figure 11



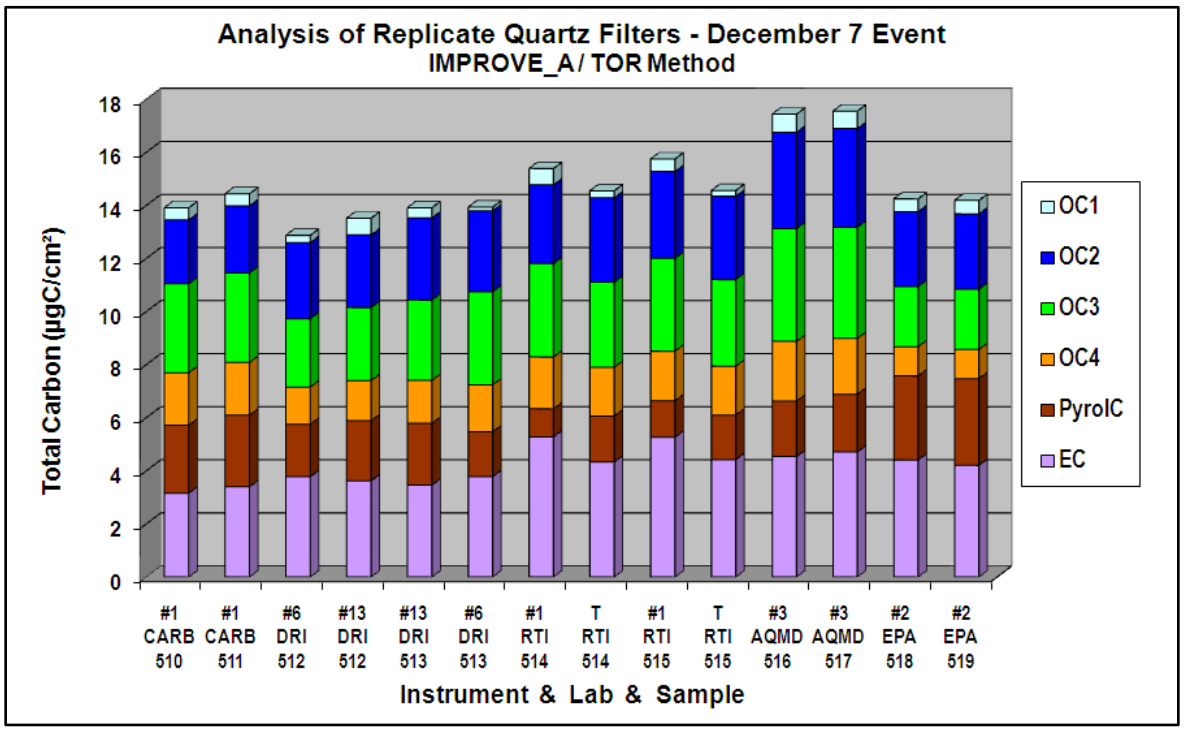
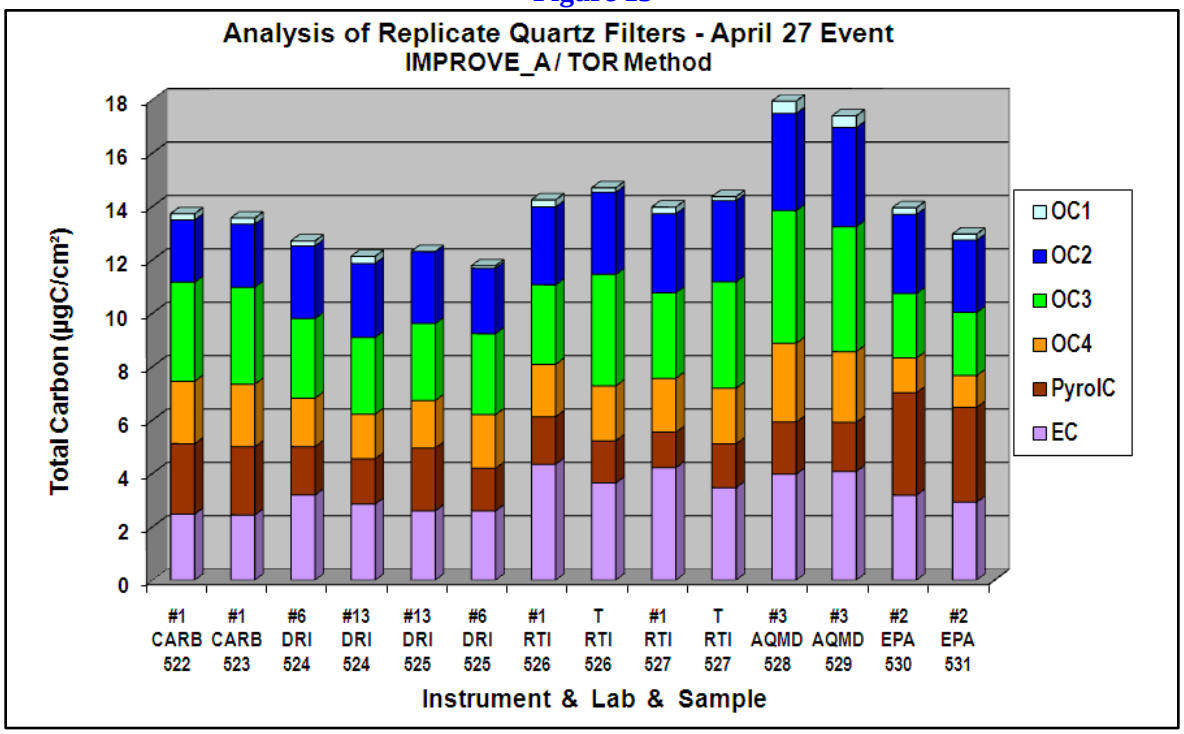


Figure 12

The results are presented again in figures 12 and 13 with more detail, and this time the OC subfractions are revealed. Both figures show unusual variability in the TC results. AQMD consistently reported the highest TC values, and DRI reported the lowest. Even though all of the instruments used the same method, there is noticeable variability for carbon fractions. It is not unusual to see variation in the subfractions such as the OC1 and PyrolC.

Figure 13



Even though implementation of the new URG 3000N samplers is complete, a few of the CSN field sites have not discontinued carbon sampling with the Met One sampler. EPA has decided to perform dual sampling at a few sites to demonstrate comparability of the carbon sampling and analysis methods. At the dual sampling sites, the exposed quartz filters that are recovered from the Met One sampler are analyzed at RTI using the CSN method, and filters recovered from the URG 3000N sampler are analyzed at DRI using the IMPROVE_A method.

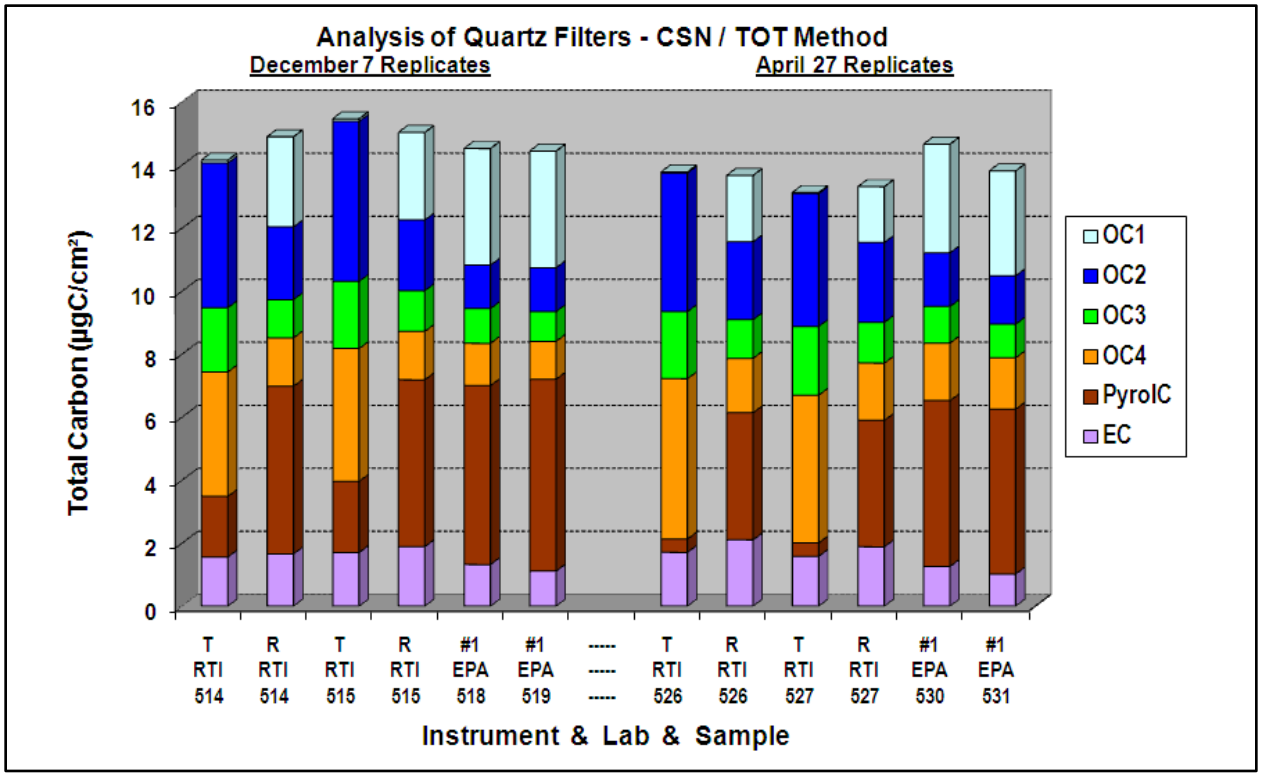


Figure 14

For this study, RTI and NAREL were the only labs that reported results from both TOA methods. Figure 14 presents the CSN TOT results from December 7 replicates on the left side of the graph and results from the April 27 replicates on the right side of the graph. Figure 14 shows reasonably good agreement for the results reported from EPA's instrument #1 and the RTI's instrument "R". However, some of the results from RTI's instrument "T" are dramatically different. Specifically, why is OC2 and OC4 so large from instrument "T", and why is OC1 and PyrolC so small?

It is interesting to compare the CSN results shown in figure 14 with the IMPROVE_A results shown previously in figures 12 and 13. The TC reported for each sample in Figure 14 was in good agreement with the TC reported using the IMPROVE_A method. Yet it is not surprising that the EC reported from the CSN TOT method was significantly smaller than EC from the IMPROVE_A TOR method.

Results from all of the quartz filters are presented in table 12 at the end of this report. This table includes the uncertainty of measurement when it was available. Table 12 also contains results from the blank filters that were part of each set of PT samples.

XRF analysis

NAREL provided each participating laboratory with at least one set of six filters for elemental analysis using energy dispersive XRF. Each sample set contained two representative blank filters, and the remaining filters were loaded with $PM_{2.5}$ collected from the Montgomery air. Collocated Met One SuperSASS air samplers were used to simultaneously load both 47-mm and 25-mm filters during each sampling event and create replicates in each sample set according to the sampling schedule presented in table 7. It is important to note that during each sampling event replicates were prepared using both filter sizes.

Table 7. Sampling Schedule for XRF PT Filters

Filter ID	Filter Size	Sample Start	Event Duration	Test Lab	Reference Lab
T10-13325	47-mm Teflon®	01/06/10	126-hour event	CARB	RTI
T10-13326	47-mm Teflon®	01/06/10	126-hour event	CARB	RTI
T10-13340	47-mm Teflon®	04/06/10	162-hour event	CARB	RTI
T10-13341	47-mm Teflon®	04/06/10	162-hour event	CARB	RTI
T10-13356	47-mm Teflon®	blank	-----	CARB	RTI
T10-13357	47-mm Teflon®	blank	-----	CARB	RTI
T10-13327	47-mm Teflon®	01/06/10	126-hour event	DRI	RTI
T10-13328	47-mm Teflon®	01/06/10	126-hour event	DRI	RTI
T10-13342	47-mm Teflon®	04/06/10	162-hour event	DRI	RTI
T10-13343	47-mm Teflon®	04/06/10	162-hour event	DRI	RTI
T10-13358	47-mm Teflon®	blank	-----	DRI	RTI
T10-13359	47-mm Teflon®	blank	-----	DRI	RTI
T10-13329	47-mm Teflon®	01/06/10	126-hour event	ODEQ	RTI
T10-13330	47-mm Teflon®	01/06/10	126-hour event	ODEQ	RTI
T10-13344	47-mm Teflon®	04/06/10	162-hour event	ODEQ	RTI
T10-13345	47-mm Teflon®	04/06/10	162-hour event	ODEQ	RTI
T10-13360	47-mm Teflon®	blank	-----	ODEQ	RTI
T10-13361	47-mm Teflon®	blank	-----	ODEQ	RTI
T10-13331	47-mm Teflon®	01/06/10	126-hour event	AQMD	RTI
T10-13332	47-mm Teflon®	01/06/10	126-hour event	AQMD	RTI
T10-13346	47-mm Teflon®	04/06/10	162-hour event	AQMD	RTI
T10-13347	47-mm Teflon®	04/06/10	162-hour event	AQMD	RTI
T10-13362	47-mm Teflon®	blank	-----	AQMD	RTI
T10-13363	47-mm Teflon®	blank	-----	AQMD	RTI
T10-13333	47-mm Teflon®	01/06/10	126-hour event	UCD	RTI
T10-13334	47-mm Teflon®	01/06/10	126-hour event	UCD	RTI
T10-13348	47-mm Teflon®	04/06/10	162-hour event	UCD	RTI
T10-13349	47-mm Teflon®	04/06/10	162-hour event	UCD	RTI
T10-13364	47-mm Teflon®	blank	-----	UCD	RTI
T10-13365	47-mm Teflon®	blank	-----	UCD	RTI
T10-13320	25-mm Teflon®	01/06/10	126-hour event	DRI	UCD
T10-13321	25-mm Teflon®	01/06/10	126-hour event	DRI	UCD
T10-13335	25-mm Teflon®	04/06/10	162-hour event	DRI	UCD
T10-13336	25-mm Teflon®	04/06/10	162-hour event	DRI	UCD
T10-13351	25-mm Teflon®	blank	-----	DRI	UCD
T10-13352	25-mm Teflon®	blank	-----	DRI	UCD
T10-13322	25-mm Teflon®	01/06/10	126-hour event	RTI	UCD
T10-13323	25-mm Teflon®	01/06/10	126-hour event	RTI	UCD
T10-13337	25-mm Teflon®	04/06/10	162-hour event	RTI	UCD
T10-13338	25-mm Teflon®	04/06/10	162-hour event	RTI	UCD
T10-13353	25-mm Teflon®	blank	-----	RTI	UCD
T10-13354	25-mm Teflon®	blank	-----	RTI	UCD

The quality of the replicates described in table 7 was first tested at NAREL by measuring the gravimetric mass of $PM_{2.5}$ captured by each exposed filter. Table 8 shows the mass of $PM_{2.5}$ deposited onto each filter, the average deposit for each sampling event, and the relative deviation of deposit for each filter.

Table 8. Gravimetric Mass Analysis of the Exposed XRF Filters

Sampling Event	Filter Size	Filter ID	Test Lab	Ref. Lab	Filter Deposit (µg)	Average Deposit (µg)	Relative Deviation of Deposit
126-hr event starting on 01/06/10	25-mm	T10-13320	DRI	UCD	519	530.3	-2%
		T10-13321	DRI	UCD	533	530.3	1%
		T10-13322	RTI	UCD	531	530.3	0%
		T10-13323	RTI	UCD	538	530.3	1%
	47-mm	T10-13325	CARB	RTI	517	519.8	-1%
		T10-13326	CARB	RTI	491	519.8	-6%
		T10-13327	DRI	RTI	519	519.8	0%
		T10-13328	DRI	RTI	521	519.8	0%
		T10-13329	ODEQ	RTI	508	519.8	-2%
		T10-13330	ODEQ	RTI	526	519.8	1%
		T10-13331	AQMD	RTI	526	519.8	1%
		T10-13332	AQMD	RTI	530	519.8	2%
		T10-13333	UCD	RTI	531	519.8	2%
		T10-13334	UCD	RTI	529	519.8	2%
162-hr event starting on 04/06/10	25-mm	T10-13335	DRI	UCD	719	705.8	2%
		T10-13336	DRI	UCD	702	705.8	-1%
		T10-13337	RTI	UCD	702	705.8	-1%
		T10-13338	RTI	UCD	700	705.8	-1%
	47-mm	T10-13340	CARB	RTI	712	722.3	-1%
		T10-13341	CARB	RTI	709	722.3	-2%
		T10-13342	DRI	RTI	704	722.3	-3%
		T10-13343	DRI	RTI	717	722.3	-1%
		T10-13344	ODEQ	RTI	726	722.3	1%
		T10-13345	ODEQ	RTI	733	722.3	1%
		T10-13346	AQMD	RTI	730	722.3	1%
		T10-13347	AQMD	RTI	737	722.3	2%
		T10-13348	UCD	RTI	731	722.3	1%
		T10-13349	UCD	RTI	724	722.3	0%

Furthermore it was decided that all of the filters should be analyzed at a single [reference] laboratory so that the quality of replicates could be further examined before they were redistributed to the other labs. Consequently all of the 47-mm filters were first analyzed at RTI, and all of the 25-mm filters were first analyzed at UCD before they were returned to NAREL for redistribution to the remaining XRF labs.

This report includes results from the reference labs as well as the subsequent results from test labs. Therefore analytical results from two different labs are presented for every filter. Each lab received exposed filters and at least two representative blank filters as described previously in table 7. NAREL requested each lab to report results as micrograms of the element per filter (µg/filter) and supply the uncertainty of measurement along with each result. Some results were reported in units of mass per area (e.g. $\mu g/cm^2$), and in those cases, results were multiplied by the total area of the deposit to produce the final results that appear in this report. It is interesting to note that all labs did not use a consistent deposit area for a given filter size. Most labs used 11.3 cm^2 for the deposit area of a 47-mm filter, but DRI, ODEQ, and AQMD used 11.7, 11.82, and 12.0 cm^2 respectively. For those labs that analyzed 25-mm

filters, UCD used 3.53 cm^2 for the deposit area, but DRI and RTI used 3.50 and 3.46 cm^2 respectively. This small source of inter-laboratory bias would be eliminated if all labs agreed to use a consistent deposit area for each filter size.

All of the participating labs have an SOP for their XRF analysis. Some of the SOP's are currently available on the web for easy viewing (see reference 23 through 28).

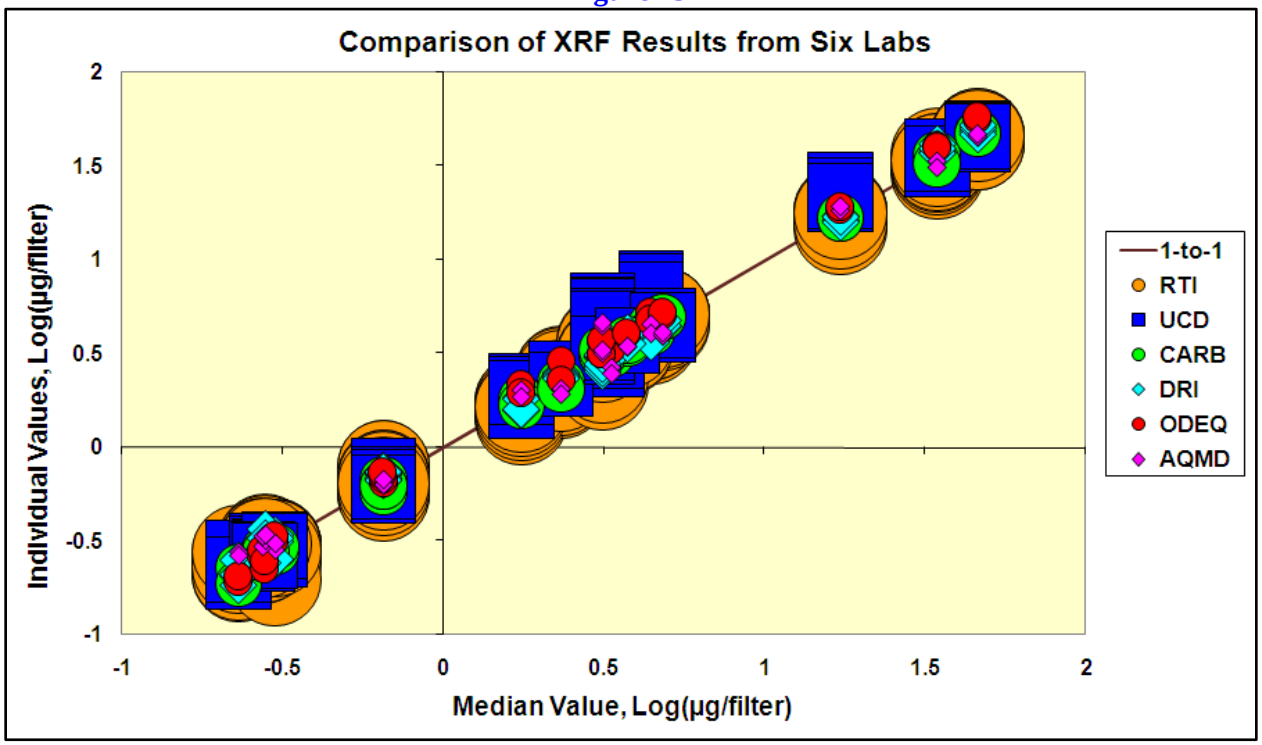
XRF Results

All labs participating in this study were able to report results from a set of 47-mm filters with RTI serving as the reference lab. DRI and RTI also reported results from 25-mm filters with UCD serving as the reference lab.

Each laboratory reported a set of elements that was part of its routine operation, and therefore, all labs did not report the same consistent set of elements. For example, UCD reported a set of twenty-four elements that are routinely reported for the IMPROVE program. RTI reported a set of thirty-three elements currently required for their contract with EPA. A decision was made for this report to include only those elements that were reported by the reference labs. Accordingly, this report includes results for thirty-three elements reported from the 47-mm filters and twenty-four elements reported from 25-mm filters.

All of the XRF results that were significantly above the reported uncertainties have been compared to the median values by constructing a scatter plot shown in figure 15. A log-log plot was constructed with the median values forming a straight line of unity slope. The corresponding results from all of the labs were superimposed on the median line. Most of the results were very near the median indicating good agreement among the participating labs. Even though figure 15 gives a quick visual impression of many results that cover a wide range of concentrations, this scatter plot does not identify the element plotted or the sample.

Figure 15



The more significant results are presented again as stacked-bar graphs in figures 16 and 17. Results from the 47-mm filters are shown on the left side of the figure, and results from the 25-mm filters are shown on the right side. Each bar segment represents an individual value reported by one of the labs. You will notice that every other segment of each bar in the graph represents a value determined by the reference lab. By presenting results in this manner, it is possible to show the test lab result immediately above the reference lab result with both labs having analyzed the same filter. Elements are identified along the horizontal axis, and the elements are arranged from left to right in order of decreasing concentration. The vertical axis of each bar graph is a linear scale, and each bar is normalized to the sum of the bar segments. Each bar segment is color coded to identify the lab and labeled to show the reported concentration value.

Figure 16

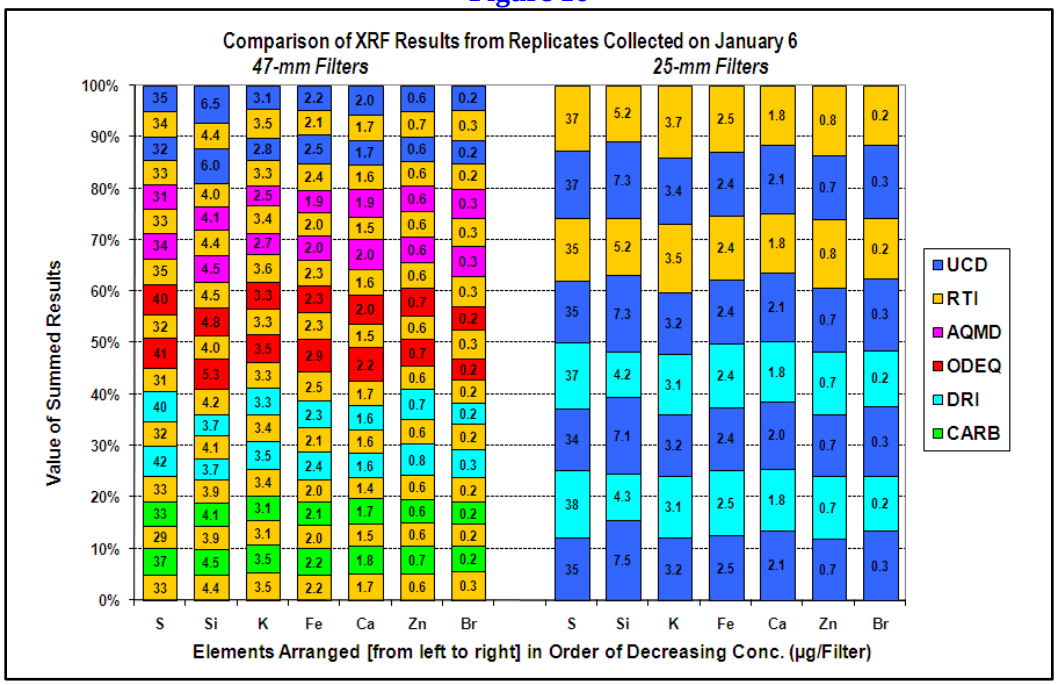
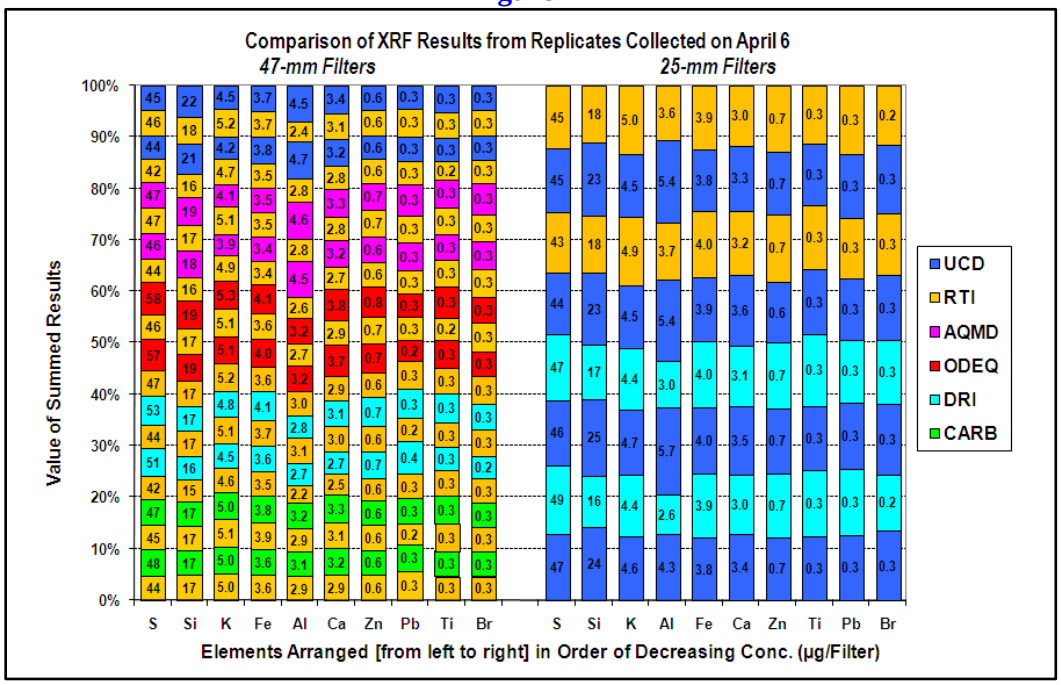


Figure 17



The normalized stacked-bar graphs presented in figures 16 and 17 show at a glance the level of agreement among the different labs for several elements. Each bar in the graph would have equal segments if all of the results were in perfect agreement. Again, the only results shown in the graphs are those that are significantly above the reported uncertainty. Those significant results can be identified in tables 13 and 14 by looking for a calculated median.

Figures 18 through 29 present another view of the XRF results which allows us to examine the uncertainty reported by each lab. Notice that the error bars represent a 3-sigma uncertainty which was used to select those results previously presented in figures 15 through 17. Each figure shows results for a single element identified in the title of the graph. The horizontal axis of the graph is labeled to associate each result with a sampling event and filter size. Each pair of bars within the graph represents a single filter, and the bars are color coded to identify the reporting laboratory. Notice in figures 18 through 29 that the result from the reference lab is always presented immediately to the left of the test lab result.

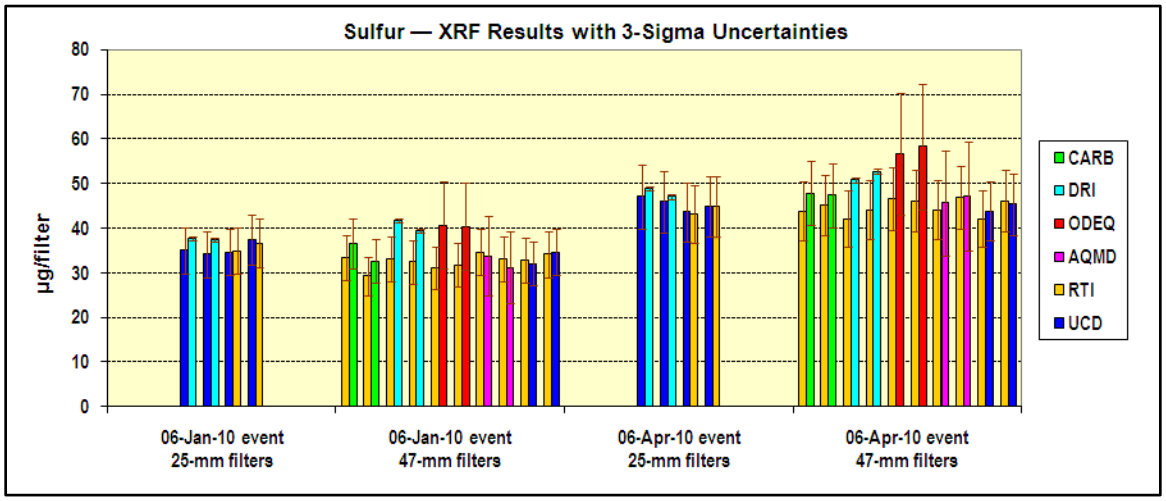
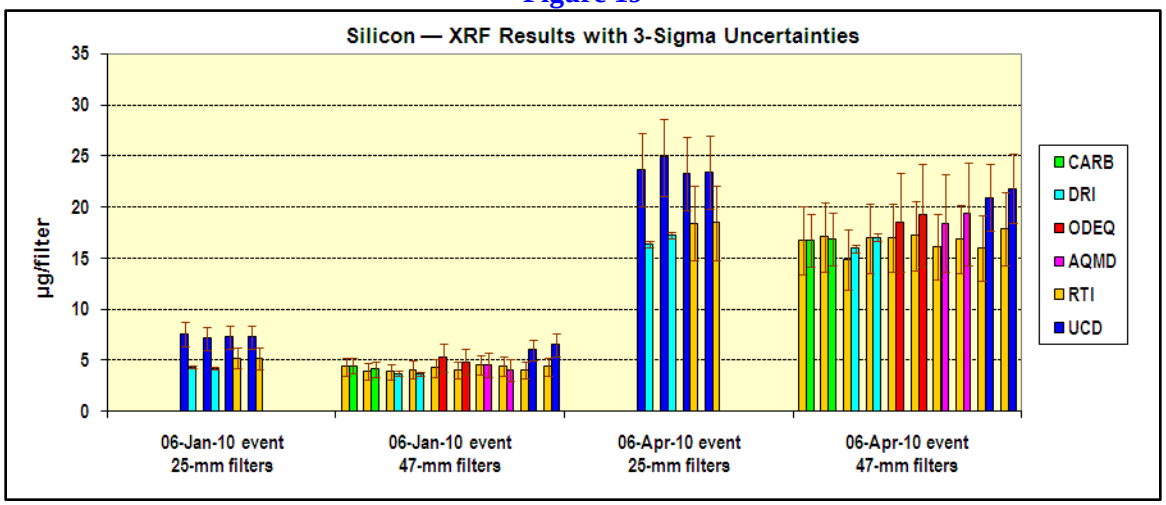


Figure 18

Results for sulfur are presented in figure 18. It was the most abundant element reported by all of the labs, and sulfur is a large peak in the analytical spectrum. According to table 8, filters from the January 6 sampling event captured less $PM_{2.5}$ mass than filters from the April 6 event. Figure 18 shows reasonably good agreement among all of the labs for the sulfur concentration. There is less agreement for the uncertainty estimates, and DRI reported noticeably smaller uncertainties than the other labs.

Figure 19 shows results from silicon, and some discrepancies are observed. For example, silicon results from UCD are consistently higher than results from the other labs.

Figure 19



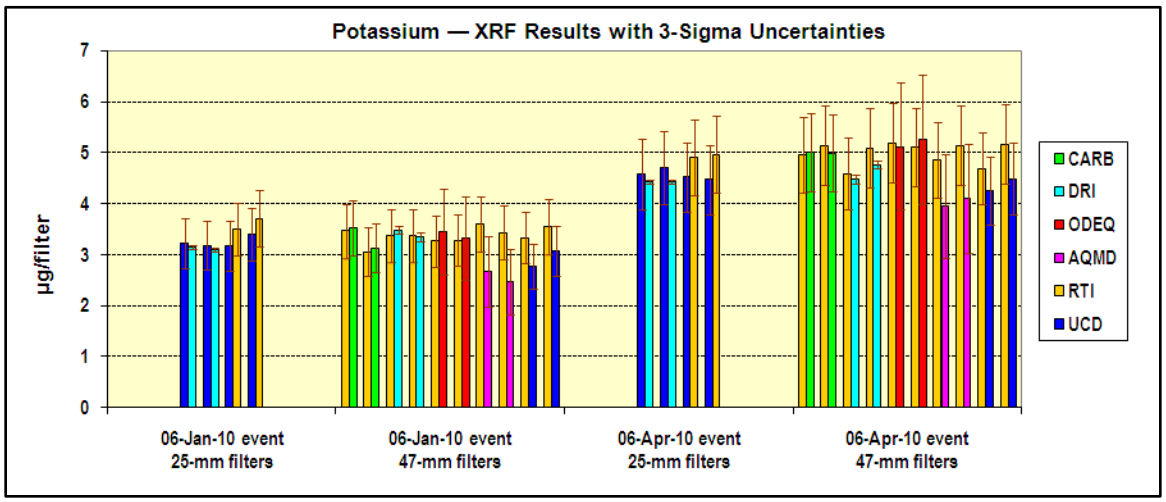


Figure 20

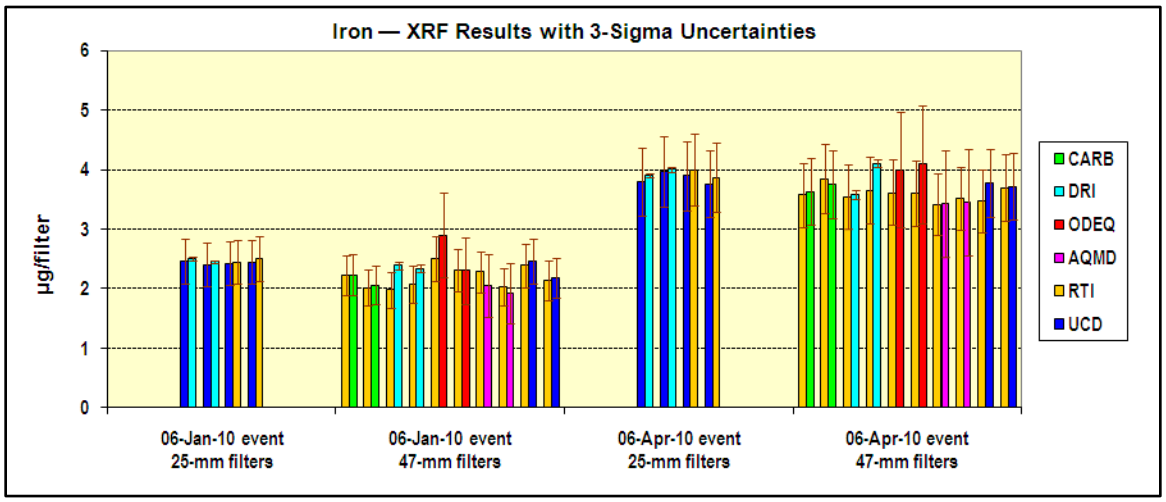


Figure 21

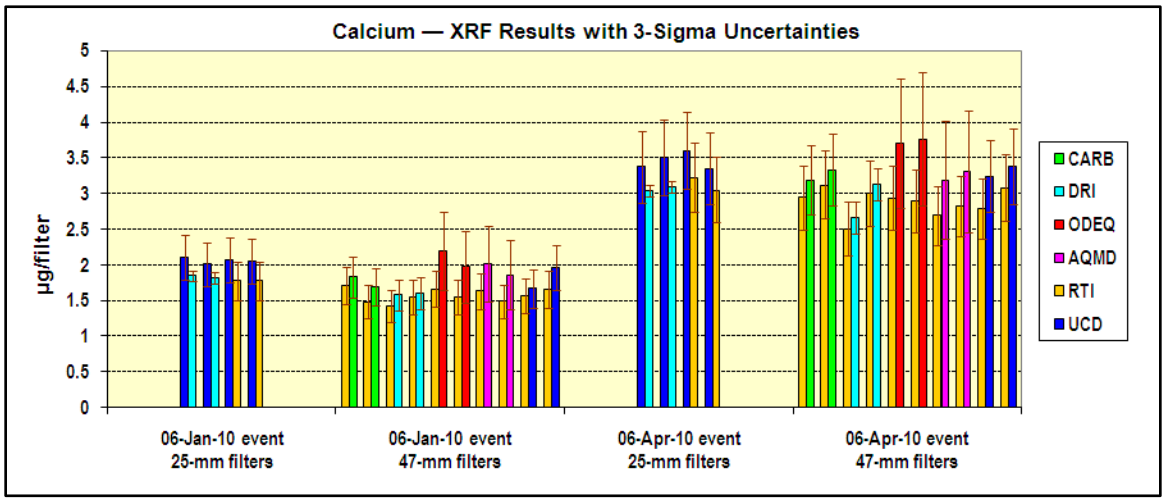


Figure 22

Results for potassium, iron, and calcium are presented in figures 20 through 22, and reasonably good inter-lab agreement is observed for these results.

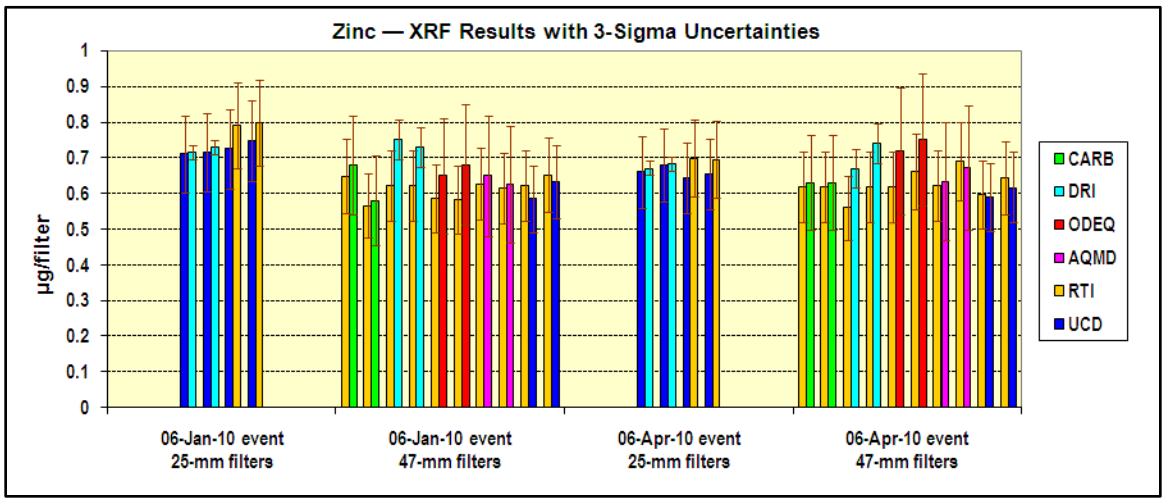


Figure 23

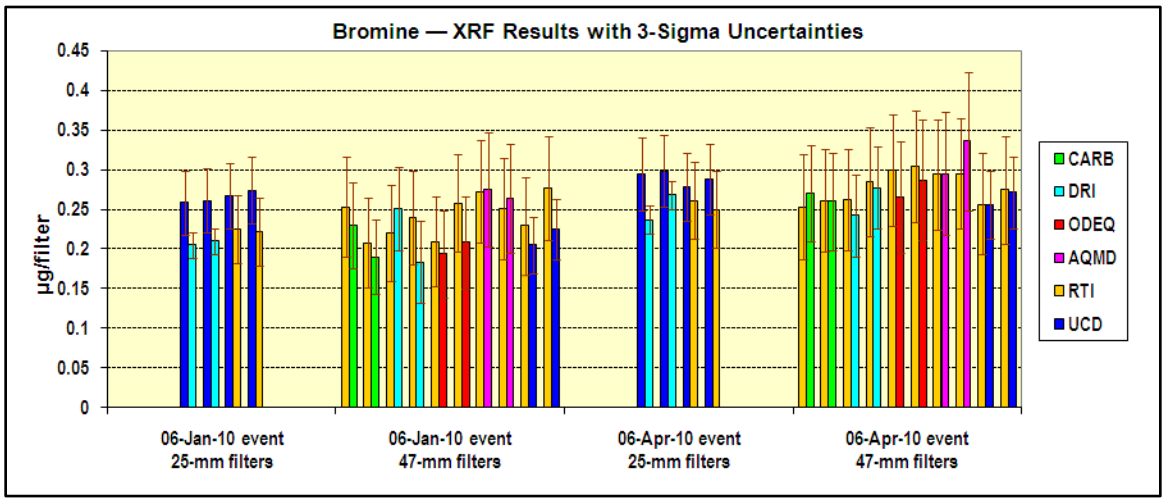


Figure 24

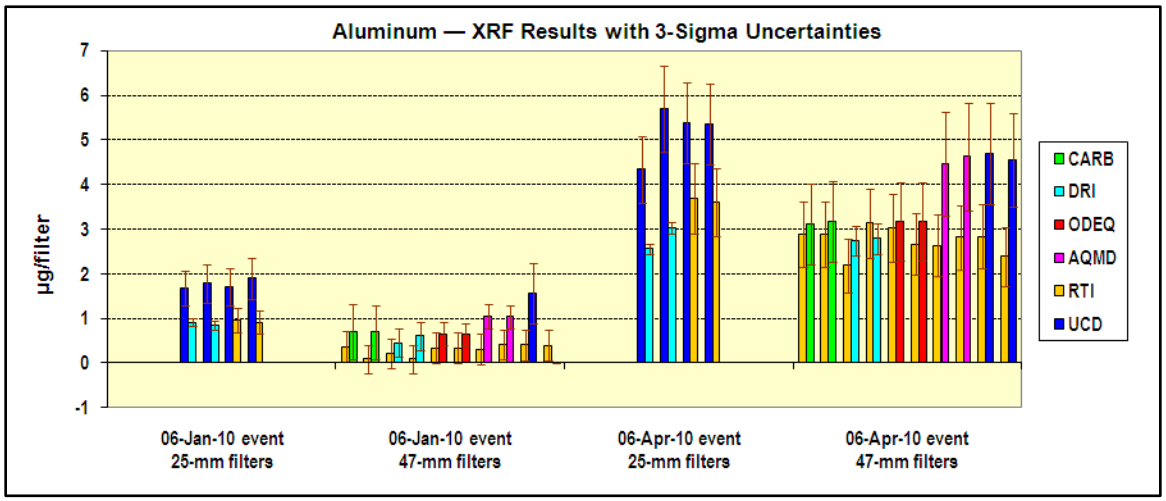


Figure 25

All of the results shown in figure 23 and 24 were less than 1 microgram per filter, yet zinc and bromine were easily detected by all laboratories participating in this study. Aluminum is more difficult to detect however, and some of the results presented in figure 25 are smaller than the 3-sigma uncertainty.

Stacked bar graphs were used earlier in this report to present results from several elements at the same time (see figure 16 and 17). Aluminum was not included in figure 16 because the concentration reported for some of the January 6 replicates was too small compared to the uncertainty. Titanium and lead were not included in figure 16 for the same reason.

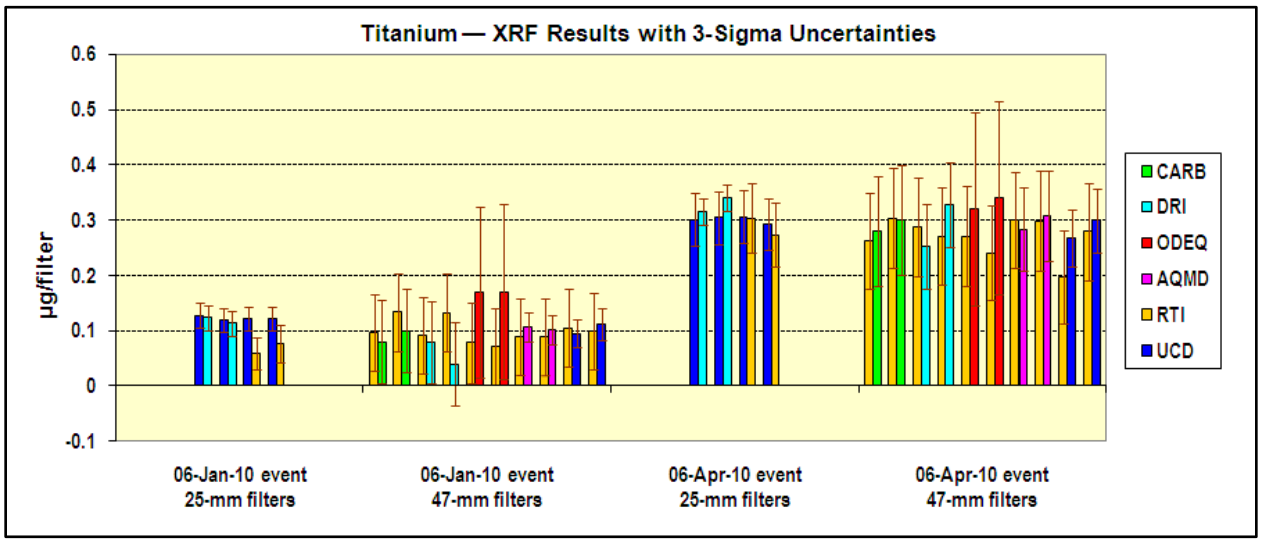


Figure 26

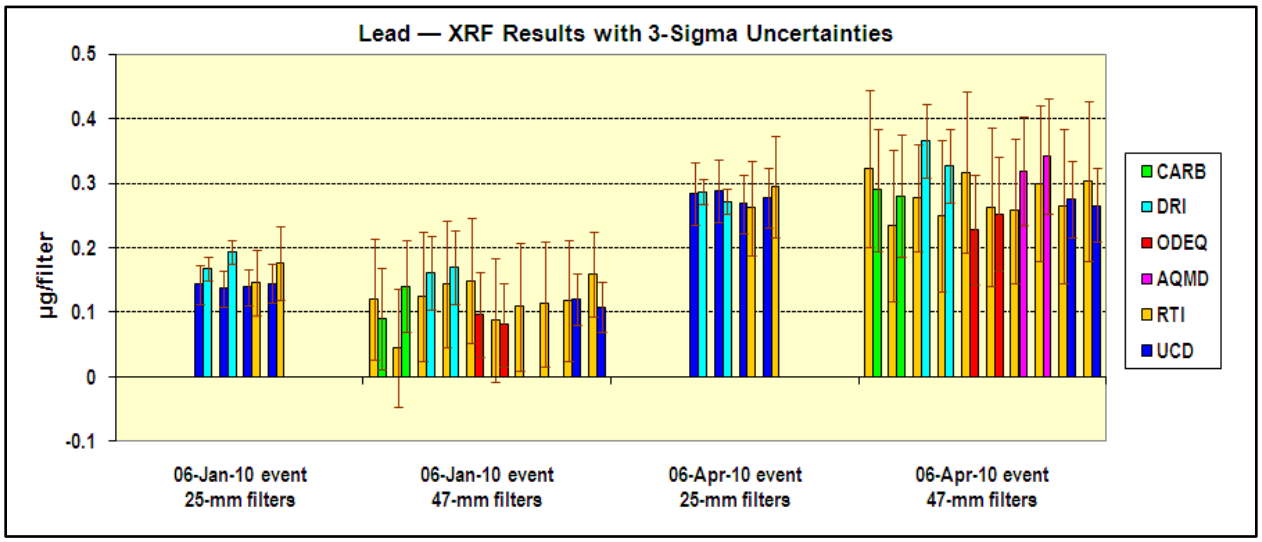


Figure 27

Figure 26 shows one titanium result that was smaller than the 3-sigma uncertainty. That result was reported by DRI, and it is easily identified in the graph since the uncertainty range extends below the zero concentration level. Figure 27 shows two lead results reported by RTI that were smaller than the 3-sigma uncertainty.

Manganese and copper results are presented in figure 28 and 29. It is interesting to note that for these two elements, DRI reported the largest uncertainties. The large uncertainties reported by DRI were responsible for excluding manganese and copper from the stacked-bar plots presented earlier in this report as figures 16 and 17. As stated previously, the stacked-bar plots include only those elements that were reported with high confidence such that every lab reported a result larger than the 3-sigma uncertainty.

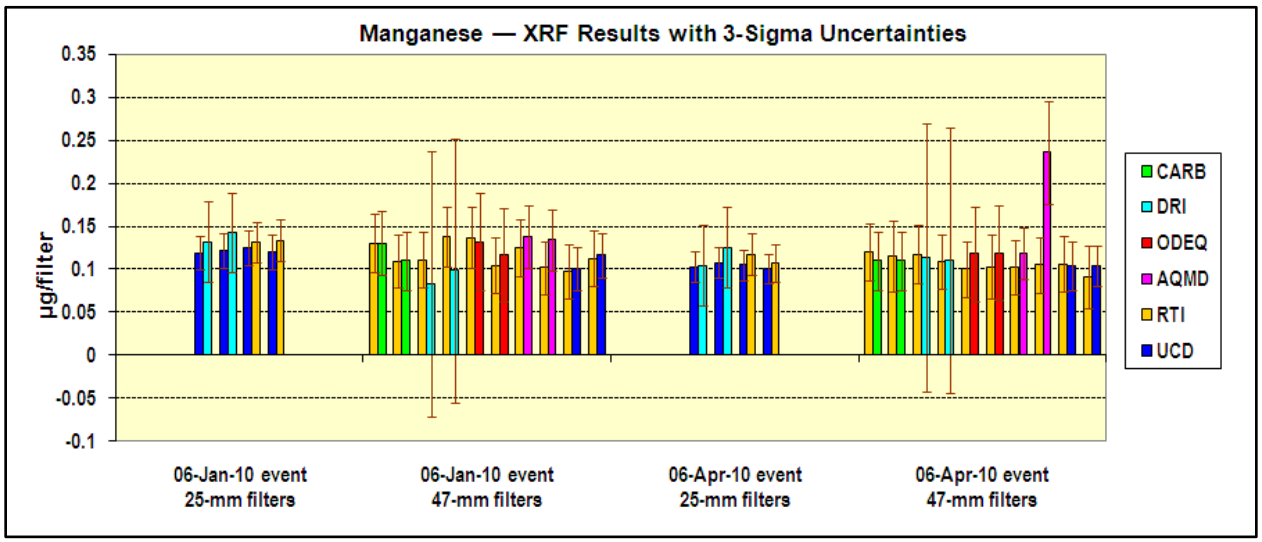


Figure 28

One manganese result in figure 28 was significantly higher than other reported values. The high value was reported by AQMD for one of the April 6 replicates. It is worth noting that AQMD also reported manganese contamination on one of the blank test filters included in this study (see table 13).

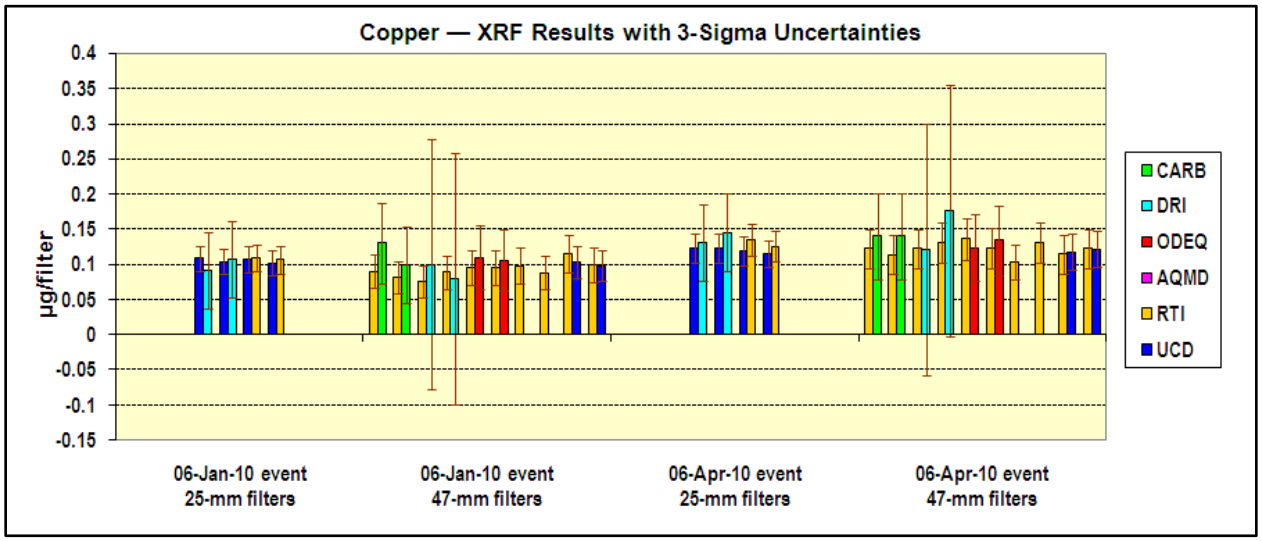


Figure 29

Table 9a is a summary of results for several elements grouped by sample type. Each statistical value in the table was derived from the results of twenty-one elements reported from each lab after having analyzed all of the replicates submitted of both filter sizes.

Table 9b is a summary of the reported uncertainties grouped by sample type. Both tables are structured to offer the same information matrix so that each statistical value in table 9a can be identified with the corresponding uncertainty value in table 9b. For example, the mean of 252 results reported by RTI for the January 6 replicates was 2.230 µg/filter, and the mean uncertainty for the same set of results was 0.132 µg/filter. It may be helpful to identify those elements that are summarized in tables 9a and 9b. Since all of the labs did not report the same set of elements, a decision was made to calculate the statistical parameters based upon the largest subset of twenty-one elements that were reported by all of the labs for every filter. The statistical values in tables 9a and 9b were based upon results and uncertainties reported for the following elements: Al, Si, P, S, Cl, K, Ca, Ti, V, Cr, Mn, Fe, Ni, Cu, Zn, As, Se, Br, Rb, Sr, and Pb.

Table 9a. Summary of XRF Results for Twenty-one Elements (µg/filter)

	RTI	UCD	CARB	DRI	ODEQ	AQMD
Number of Jan 6 Replicates Analyzed	12	6	2	4	2	2
Mean	2.230	2.481	3.228	2.514	3.721	4.182
Max	36.590	37.375	36.570	41.782	40.600	33.795
Min	0.0000	0.0000	0.0300	0.0000	0.0400	0.1020
Std. Dev.	7.027	7.410	8.636	8.315	10.109	9.262
Count	252	126	30	84	30	22
Number of Apr 6 Replicates Analyzed	12	6	2	4	2	2
Mean	3.726	4.130	4.418	3.944	6.989	6.911
Max	46.861	47.034	47.780	52.672	58.300	47.180
Min	0.0000	0.0000	0.0200	0.0000	0.0410	0.1180
Std. Dev.	9.881	10.459	11.164	10.961	15.356	13.179
Count	252	126	37	84	27	24
Number of Blank Filters Analyzed	12	6	2	4	2	2
Mean	0.001	0.016	-----	0.004	-----	0.110
Max	0.053	0.429	-----	0.058	-----	0.110
Min	0.0000	0.0000	-----	0.0000	-----	0.1100
Std. Dev.	0.005	0.059	-----	0.011	-----	-----
Count	252	126	0	84	0	1

Table 9b. Summary of XRF Uncertainties for Twenty-one Elements (µg/filter)

	RTI	UCD	CARB	DRI	ODEQ	AQMD
Number of Jan 6 Replicates Analyzed	12	6	2	4	2	2
Mean	0.132	0.130	0.184	0.028	0.243	0.362
Max	1.833	1.874	1.836	0.158	3.267	2.927
Min	0.0019	0.0000	0.0090	0.0049	0.0077	0.0090
Std. Dev.	0.350	0.373	0.430	0.034	0.693	0.802
Count	252	126	30	84	42	22
Number of Apr 6 Replicates Analyzed	12	6	2	4	2	2
Mean	0.217	0.213	0.240	0.033	0.402	0.599
Max	2.351	2.357	2.397	0.197	4.687	4.086
Min	0.0024	0.0000	0.0090	0.0049	0.0076	0.0100
Std. Dev.	0.512	0.527	0.558	0.044	1.019	1.141
Count	252	126	37	84	42	24
Number of Blank Filters Analyzed	12	6	2	4	2	2
Mean	0.017	0.004	-----	0.020	0.021	0.010
Max	0.103	0.100	-----	0.104	0.056	0.010
Min	0.0012	0.0000	-----	0.0049	0.0071	0.0100
Std. Dev.	0.022	0.014	-----	0.021	0.016	-----
Count	252	126	0	84	42	1

The largest single uncertainty in table 9b was reported from the ODEQ lab. It was the uncertainty associated with sulfur reported for one of the April 6 replicates (i.e. 58.3 ± 4.687 µg/filter reported sulfur). This largest single uncertainty represented 8 % of the sulfur concentration that was reported. Very small uncertainties reported by DRI were observed earlier in several of the bar graphs. According to table 9b, the average uncertainty reported by DRI for exposed filters is significantly smaller than values reported by other labs. However, the average uncertainty reported by DRI for blank filters was not significantly smaller than values reported by other labs.

Regarding the summary of uncertainties presented in table 9b, a few comments are appropriate. CARB and AQMD reported uncertainties for the elements that were detected but did not report uncertainties for

the undetected elements. UCD reported the uncertainty for a detected element, but reported a zero uncertainty for each undetected element. All of the participating labs reported a Method Detection Limit (MDL) for the elements reported.

A complete listing of the XRF results is included at the end of this report. Results from the 47-mm filters are presented in table 13, and results from the 25-mm filters are presented in table 14. Both tables include the analytical result, uncertainty, and the MDL reported by each lab. The tables also include a median value for those more significant results presented earlier in figures 15 through 17.

Conclusions

This study was designed to evaluate the analytical performance of several $PM_{2.5}$ speciation labs. The approach was similar to the study conducted in 2009 (see reference 29). Each test lab analyzed a similar set of blind PT filters that contained hidden replicates and blanks, and the results reported from all of the labs have been compared. The scope of the study included four analytical techniques, and multiple methods were reported for the IC, TOA carbon, and XRF. The EPA lab was able to report results for all of the methods used during this study except for XRF. RTI and UCD were good choices to serve as a reference lab for the XRF determinations.

Six test labs analyzed a set of PT samples for gravimetric mass, and excellent results were observed from all of the participating labs. All of the results from the test labs showed good agreement with the gravimetric results reported from NAREL.

Six different labs reported IC results from at least one set of PT samples, and three different methods were tested. Both Nylon® and Teflon® filters were analyzed for selected ions during this study. Reasonably good agreement was observed in the results reported by different labs for the hidden replicates, and no alarming results were reported for the blank test filters.

Five labs analyzed a set of quartz PT filters, and three of the labs analyzed each filter multiple times in order to report results using more than one instrument. All five labs reported results using the IMPROVE_A method, but only two labs, RTI and NAREL, reported results using the CSN method. A total of ten data packages were reported with TOA carbon results. Each lab received an almost identical set of filters, and every set of filters contained hidden replicates and blanks.

Two trends were observed in the total carbon (TC) values reported for this study. AQMD consistently reported the highest TC values which were 22-30% higher than the median value reported for hidden replicates. DRI consistently reported the lowest TC values which were 3-12% lower than the median. Both of these trends in TC results from AQMD and DRI were also observed in previous studies, yet the exact cause of this performance is still unknown.

Good precision was observed for almost all of the carbon fractions reported for this study. However, one of the instruments at RTI reported unexpected results for some of the OC subfractions. RTI's instrument "T" consistently reported outlier values for OC1, OC2, OC4, and PyrolC utilizing the CSN/TOT method. Results were also reported from instrument "T" utilizing the IMPROVE_A method, but no outliers were observed in those results. What was responsible for the dramatic shift in performance observed for instrument "T"? What caused the outliers? These are both good questions.

This is the third study supported by NAREL that includes both 25-mm and 47-mm filters for XRF analysis. By sampling and analyzing two different filter media, an extra level of investigation is possible. This study was able to compare results from different laboratories and also from different filter media. The 25-mm filters are routinely used in the IMPROVE program, and these filters not only provide a smaller deposit area, but also have a much thinner Teflon® membrane compared to the 47-mm filters. Six XRF labs participated in this study. By design, the results reported from several test labs were compared to the results from a single reference lab. All thirty of the 47-mm filters used in this study were first analyzed at RTI before they were redistributed as blind sample sets to the other test labs. Similarly, all twelve of the 25-mm filters were first analyzed at UCD before they were redistributed to DRI and RTI

as blind PT samples. Having a single reference lab analyze all of the samples provides valuable information about the quality of filter replicates that goes beyond weighing all of the filters to determine mass captured. Having good replicates was an important element of the study.

A variety of instruments were used to produce the XRF results in this report. Different instruments create different raw data spectra (reference 30) and furthermore, different labs use different data reduction algorithms. Several factors were different for the two filter media that include the following.

- different filter face velocity during sampling
- different thickness of deposit that may affect signal attenuation
- different thickness of filter membrane that affects the background spectrum
- different sensitivity for the elements with calibration standards based upon $\mu g/cm^2$

Even with these considerations, there was reasonably good agreement among labs, especially for the more abundant elements. Bar graphs have been presented that also show good comparability of results between the two different filter media.

EPA appreciates the exceptional contributions from DRI, RTI, and UCD. These three labs made it possible to include 25-mm filters in this study. It should be stated that RTI does not routinely analyze 25-mm Teflon® filters, DRI does not routinely analyze 25-mm Teflon® and Nylon® filters, and UCD does not normally analyze 47-mm filters. These labs made extra effort to report results from both routine and non-routine filter media. The RTI and UCD labs were also willing to serve as reference labs.

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Table 10. Gravimetric Mass PT Results

Sample ID	Sample Description	Tare Mass		Final Mass		Captured $PM_{2.5}$		Inter-Lab Difference* of Captured $PM_{2.5}$ (mg)	Name of the Test Lab
		Test Lab (mg)	NAREL (mg)	Test Lab (mg)	NAREL (mg)	Test Lab (mg)	NAREL (mg)		
T10-13366	60-hr event 12/10/10	143.724	143.728	143.982	143.982	0.258	0.254	-0.004	CARB
T10-13367	60-hr event 12/10/10	141.485	141.489	141.736	141.738	0.251	0.249	-0.002	CARB
T10-13368	24-hr event 12/13/10	142.621	142.622	142.660	142.667	0.039	0.045	0.006	CARB
T10-13369	24-hr event 12/13/10	144.595	144.596	144.636	144.640	0.041	0.044	0.003	CARB
T10-13370	20-hr event 12/14/10	144.633	144.634	144.747	144.752	0.114	0.118	0.004	CARB
T10-13371	20-hr event 12/14/10	145.404	145.406	145.518	145.523	0.114	0.117	0.003	CARB
T10-13372	46-hr event 12/15/10	147.173	147.175	147.303	147.306	0.130	0.131	0.001	CARB
T10-13373	blank	142.312	142.313	142.314	142.314	0.002	0.001	-0.001	CARB
T10-13374	blank	140.344	140.346	140.345	140.347	0.001	0.001	0.000	CARB
T10-13375	blank	143.725	143.727	143.725	143.728	0.000	0.001	0.001	CARB
MW10-13426	metallic transfer weight	193.819	193.822	193.821	193.821	0.002	-0.001	-0.003	CARB
MW10-13427	metallic transfer weight	92.956	92.960	92.959	92.959	0.003	-0.001	-0.004	CARB
T10-13376	60-hr event 12/10/10	141.635	141.613	141.887	141.869	0.252	0.256	0.004	DRI
T10-13377	60-hr event 12/10/10	140.032	140.008	140.283	140.263	0.251	0.255	0.004	DRI
T10-13378	24-hr event 12/13/10	143.436	143.408	143.475	143.453	0.039	0.045	0.006	DRI
T10-13379	24-hr event 12/13/10	144.586	144.561	144.627	144.604	0.041	0.043	0.002	DRI
T10-13380	20-hr event 12/14/10	145.786	145.761	145.903	145.883	0.117	0.122	0.005	DRI
T10-13381	20-hr event 12/14/10	141.708	141.685	141.821	141.801	0.113	0.116	0.003	DRI
T10-13382	46-hr event 12/15/10	142.042	142.017	142.170	142.147	0.128	0.130	0.002	DRI
T10-13383	blank	142.796	142.773	142.798	142.775	0.002	0.002	0.000	DRI
T10-13384	blank	136.366	136.343	136.367	136.344	0.001	0.001	0.000	DRI
T10-13385	blank	136.782	136.755	136.781	136.757	-0.001	0.002	0.003	DRI
MW10-13428	metallic transfer weight	186.994	186.994	186.994	186.994	0.000	0.000	0.000	DRI
MW10-13429	metallic transfer weight	90.603	90.604	90.601	90.602	-0.002	-0.002	0.000	DRI
T10-13386	60-hr event 12/10/10	142.028	142.026	142.274	142.277	0.246	0.251	0.005	ODEQ
T10-13387	60-hr event 12/10/10	143.120	143.119	143.366	143.373	0.246	0.254	0.008	ODEQ

Table 10. Gravimetric Mass PT Results

Sample ID	Sample Description	Tare Mass		Final Mass		Captured $PM_{2.5}$		Inter-Lab Difference* of Captured $PM_{2.5}$ (mg)	Name of the Test Lab
		Test Lab (mg)	NAREL (mg)	Test Lab (mg)	NAREL (mg)	Test Lab (mg)	NAREL (mg)		
T10-13388	24-hr event 12/13/10	141.912	141.914	141.947	141.952	0.035	0.038	0.003	ODEQ
T10-13389	24-hr event 12/13/10	141.795	141.796	141.830	141.835	0.035	0.039	0.004	ODEQ
T10-13390	20-hr event 12/14/10	140.857	140.856	140.964	140.970	0.107	0.114	0.007	ODEQ
T10-13391	20-hr event 12/14/10	141.574	141.575	141.678	141.683	0.104	0.108	0.004	ODEQ
T10-13392	46-hr event 12/15/10	140.048	140.048	140.174	140.181	0.126	0.133	0.007	ODEQ
T10-13393	blank	140.618	140.617	140.615	140.618	-0.003	0.001	0.004	ODEQ
T10-13394	blank	139.254	139.253	139.251	139.254	-0.003	0.001	0.004	ODEQ
T10-13395	blank	138.692	138.690	138.688	138.689	-0.004	-0.001	0.003	ODEQ
MW10-13430	metallic transfer weight	190.524	190.523	190.521	190.522	-0.003	-0.001	0.002	ODEQ
MW10-13431	metallic transfer weight	94.834	94.833	94.830	94.831	-0.004	-0.002	0.002	ODEQ
T10-13396	60-hr event 12/10/10	137.857	137.858	138.106	138.111	0.249	0.253	0.004	RTI
T10-13397	60-hr event 12/10/10	140.076	140.078	140.329	140.335	0.253	0.257	0.004	RTI
T10-13398	24-hr event 12/13/10	141.462	141.463	141.505	141.506	0.043	0.043	0.000	RTI
T10-13399	24-hr event 12/13/10	138.750	138.749	138.790	138.794	0.040	0.045	0.005	RTI
T10-13400	20-hr event 12/14/10	138.820	138.819	138.931	138.938	0.111	0.119	0.008	RTI
T10-13401	20-hr event 12/14/10	139.752	139.748	139.862	139.865	0.110	0.117	0.007	RTI
T10-13402	46-hr event 12/15/10	141.289	141.288	141.416	141.420	0.127	0.132	0.005	RTI
T10-13403	blank	141.279	141.279	141.283	141.284	0.004	0.005	0.001	RTI
T10-13404	blank	141.553	141.553	141.559	141.557	0.006	0.004	-0.002	RTI
T10-13405	blank	143.103	143.102	143.107	143.104	0.004	0.002	-0.002	RTI
MW10-13432	metallic transfer weight	173.343	173.343	173.344	173.343	0.001	0.000	-0.001	RTI
MW10-13433	metallic transfer weight	95.851	95.852	95.851	95.851	0.000	-0.001	-0.001	RTI
T10-13406	60-hr event 12/10/10	140.116	140.113	140.368	140.372	0.252	0.259	0.007	AQMD
T10-13407	60-hr event 12/10/10	140.899	140.894	141.153	141.154	0.254	0.260	0.006	AQMD
T10-13408	24-hr event 12/13/10	139.437	139.431	139.474	139.472	0.037	0.041	0.004	AQMD
T10-13409	24-hr event 12/13/10	143.229	143.225	143.267	143.265	0.038	0.040	0.002	AQMD

Table 10. Gravimetric Mass PT Results

Sample ID	Sample Description	Tare Mass		Final Mass		Captured $PM_{2.5}$		Inter-Lab Difference* of Captured $PM_{2.5}$ (mg)	Name of the Test Lab
		Test Lab (mg)	NAREL (mg)	Test Lab (mg)	NAREL (mg)	Test Lab (mg)	NAREL (mg)		
T10-13410	20-hr event 12/14/10	141.358	141.356	141.473	141.476	0.115	0.120	0.005	AQMD
T10-13411	20-hr event 12/14/10	143.161	143.154	143.272	143.275	0.111	0.121	0.010	AQMD
T10-13412	46-hr event 12/15/10	141.045	141.042	141.174	141.176	0.129	0.134	0.005	AQMD
T10-13413	blank	137.339	137.335	137.339	137.336	0.000	0.001	0.001	AQMD
T10-13414	blank	143.345	143.340	143.343	143.342	-0.002	0.002	0.004	AQMD
T10-13415	blank	145.860	145.858	145.860	145.858	0.000	0.000	0.000	AQMD
MW10-13434	metallic transfer weight	181.335	181.334	181.336	181.334	0.001	0.000	-0.001	AQMD
MW10-13435	metallic transfer weight	93.774	93.776	93.776	93.775	0.002	-0.001	-0.003	AQMD
T10-13416	60-hr event 12/10/10	47.278	47.282	47.532	47.535	0.254	0.253	-0.001	UCD
T10-13417	60-hr event 12/10/10	44.724	44.727	44.982	44.987	0.258	0.260	0.002	UCD
T10-13418	24-hr event 12/13/10	48.271	48.275	48.314	48.315	0.043	0.040	-0.003	UCD
T10-13419	24-hr event 12/13/10	46.946	46.949	46.987	46.988	0.041	0.039	-0.002	UCD
T10-13420	20-hr event 12/14/10	41.478	41.480	41.598	41.602	0.120	0.122	0.002	UCD
T10-13421	20-hr event 12/14/10	44.697	44.700	44.817	44.821	0.120	0.121	0.001	UCD
T10-13422	46-hr event 12/15/10	42.594	42.597	42.718	42.722	0.124	0.125	0.001	UCD
T10-13423	blank	42.383	42.386	42.384	42.386	0.001	0.000	-0.001	UCD
T10-13424	blank	47.105	47.108	47.105	47.108	0.000	0.000	0.000	UCD
T10-13425	blank	46.712	46.716	46.713	46.716	0.001	0.000	-0.001	UCD
MW10-13436	metallic transfer weight	41.818	41.819	41.818	41.819	0.000	0.000	0.000	UCD
MW10-13437	metallic transfer weight	38.534	38.535	38.535	38.535	0.001	0.000	-0.001	UCD

**** Negative values indicate a smaller capture determined by NAREL.***

Table 11. Ion Chromatography PT Results

Sample ID	Filter Medium	Sample Description	Lab	Method	Concentration (µg/filter)						
					Chloride	Nitrate	Nitrite	Sulfate	Ammonium	Potassium	Sodium
N10-13438	Nylon®	160-hr Event 12/27/09	CARB	CSN	-----	66.20	-----	150.00	63.60	4.15	1.17
N10-13439	Nylon®	160-hr Event 12/27/09	CARB	CSN	-----	65.20	-----	148.00	63.10	4.19	1.53
N10-13452	Nylon®	144-hr Event 5/12/10	CARB	CSN	-----	42.00	-----	165.00	46.40	2.89	16.50
N10-13453	Nylon®	144-hr Event 5/12/10	CARB	CSN	-----	46.60	-----	168.00	47.10	3.08	18.50
N10-13490	Nylon®	filter blank	CARB	CSN	-----	<0.5	-----	<1.75	<0.5	<1.25	<0.75
N10-13491	Nylon®	filter blank	CARB	CSN	-----	<0.5	-----	<1.75	<0.5	<1.25	<0.75
N10-13440	Nylon®	160-hr Event 12/27/09	DRI	CSN	-----	67.59	-----	150.92	59.58	5.18	1.16
N10-13441	Nylon®	160-hr Event 12/27/09	DRI	CSN	-----	66.89	-----	148.96	58.18	5.56	2.19
N10-13454	Nylon®	144-hr Event 5/12/10	DRI	CSN	-----	36.53	-----	161.00	46.33	3.57	11.95
N10-13455	Nylon®	144-hr Event 5/12/10	DRI	CSN	-----	45.05	-----	164.80	44.21	3.76	17.80
N10-13492	Nylon®	filter blank	DRI	CSN	-----	0.21	-----	0.00	0.02	0.00	0.07
N10-13493	Nylon®	filter blank	DRI	CSN	-----	0.15	-----	0.00	0.03	0.00	0.08
N10-13442	Nylon®	160-hr Event 12/27/09	ODEQ	CSN	-----	69.4	-----	153	59	4.46	<3.6
N10-13443	Nylon®	160-hr Event 12/27/09	ODEQ	CSN	-----	63	-----	135	50.8	3.72	<3.6
N10-13456	Nylon®	144-hr Event 5/12/10	ODEQ	CSN	-----	48.1	-----	189	47.4	2.78	16.9
N10-13457	Nylon®	144-hr Event 5/12/10	ODEQ	CSN	-----	49.5	-----	184	46.9	2.71	17.9
N10-13494	Nylon®	filter blank	ODEQ	CSN	-----	<1.4	-----	<1.4	<0.72	<1.1	<3.6
N10-13495	Nylon®	filter blank	ODEQ	CSN	-----	<1.4	-----	<1.4	<0.72	<1.1	<3.6
N10-13444	Nylon®	160-hr Event 12/27/09	RTI	CSN	-----	65.52	-----	148.24	63.69	4.17	1.06
N10-13445	Nylon®	160-hr Event 12/27/09	RTI	CSN	-----	65.78	-----	149.95	63.88	4.30	1.18
N10-13458	Nylon®	144-hr Event 5/12/10	RTI	CSN	-----	43.37	-----	167.70	45.62	2.89	17.85
N10-13459	Nylon®	144-hr Event 5/12/10	RTI	CSN	-----	46.14	-----	167.86	45.54	3.11	18.69
N10-13496	Nylon®	filter blank	RTI	CSN	-----	0.28	-----	0.00	0.00	0.00	0.00
N10-13497	Nylon®	filter blank	RTI	CSN	-----	0.19	-----	0.00	0.00	0.00	0.00
N10-13446	Nylon®	160-hr Event 12/27/09	AQMD	CSN	-----	69.00	-----	159.00	66.00	3.80	1.50
N10-13447	Nylon®	160-hr Event 12/27/09	AQMD	CSN	-----	68.00	-----	157.00	66.00	4.00	1.50
N10-13460	Nylon®	144-hr Event 5/12/10	AQMD	CSN	-----	44.00	-----	174.00	48.00	2.30	18.00
N10-13461	Nylon®	144-hr Event 5/12/10	AQMD	CSN	-----	42.00	-----	175.00	49.00	2.20	17.00
N10-13498	Nylon®	filter blank	AQMD	CSN	-----	0.92	-----	0.12	ND	ND	ND
N10-13499	Nylon®	filter blank	AQMD	CSN	-----	0.30	-----	0.11	ND	ND	ND
N10-13448	Nylon®	160-hr Event 12/27/09	NAREL	CSN	-----	67.68	-----	154.63	58.94	5.41	1.49
N10-13449	Nylon®	160-hr Event 12/27/09	NAREL	CSN	-----	71.82	-----	152.85	59.41	5.11	1.27

Table 11. Ion Chromatography PT Results

Sample ID	Filter Medium	Sample Description	Lab	Method	Concentration (µg/filter)						
					Chloride	Nitrate	Nitrite	Sulfate	Ammonium	Potassium	Sodium
N10-13462	Nylon®	144-hr Event 5/12/10	NAREL	CSN	-----	41.84	-----	170.04	47.51	3.89	14.88
N10-13463	Nylon®	144-hr Event 5/12/10	NAREL	CSN	-----	42.95	-----	168.54	47.10	3.87	15.99
N10-13500	Nylon®	filter blank	NAREL	CSN	-----	ND	-----	ND	-0.07	ND	ND
N10-13501	Nylon®	filter blank	NAREL	CSN	-----	ND	-----	ND	-0.05	ND	0.16
N10-13466	Nylon®	227-hr Event 1/14/10	RTI	IMPROVE	4.79	61.13	0.74	236.70	93.26	-----	-----
N10-13467	Nylon®	227-hr Event 1/14/10	RTI	IMPROVE	4.79	61.56	1.74	238.42	93.88	-----	-----
N10-13478	Nylon®	144-hr Event 5/19/10	RTI	IMPROVE	6.17	32.71	0.76	211.08	62.29	-----	-----
N10-13479	Nylon®	144-hr Event 5/19/10	RTI	IMPROVE	6.79	34.38	0.80	209.12	61.98	-----	-----
N10-13502	Nylon®	filter blank	RTI	IMPROVE	0.03	0.15	0.63	0.00	0.00	-----	-----
N10-13503	Nylon®	filter blank	RTI	IMPROVE	0.04	0.14	0.60	0.00	0.00	-----	-----
N10-13468	Nylon®	227-hr Event 1/14/10	NAREL	IMPROVE	4.93	62.24	0.21	240.74	82.89	-----	-----
N10-13469	Nylon®	227-hr Event 1/14/10	NAREL	IMPROVE	4.71	62.07	0.19	238.78	82.87	-----	-----
N10-13480	Nylon®	144-hr Event 5/19/10	NAREL	IMPROVE	6.26	29.92	0.31	203.21	57.32	-----	-----
N10-13481	Nylon®	144-hr Event 5/19/10	NAREL	IMPROVE	6.45	34.59	0.29	208.83	55.59	-----	-----
N10-13504	Nylon®	filter blank	NAREL	IMPROVE	ND	0.26	1.83	ND	-0.02	-----	-----
N10-13505	Nylon®	filter blank	NAREL	IMPROVE	ND	ND	ND	ND	0.07	-----	-----
T10-13472	Teflon®	227-hr Event 1/14/10	DRI	CSN	-----	3.99	-----	231.38	78.83	4.39	5.05
T10-13473	Teflon®	227-hr Event 1/14/10	DRI	CSN	-----	3.90	-----	233.12	80.45	5.77	4.93
T10-13484	Teflon®	144-hr Event 5/19/10	DRI	CSN	-----	1.39	-----	197.42	59.16	4.10	5.15
T10-13485	Teflon®	144-hr Event 5/19/10	DRI	CSN	-----	1.10	-----	214.73	65.28	2.29	3.71
T10-13506	Teflon®	filter blank	DRI	CSN	-----	0.00	-----	0.11	0.00	0.26	0.12
T10-13507	Teflon®	filter blank	DRI	CSN	-----	0.00	-----	0.00	0.00	0.26	0.10
T10-13476	Teflon®	227-hr Event 1/14/10	NAREL	CSN	-----	4.17	-----	232.23	80.40	4.78	4.74
T10-13477	Teflon®	227-hr Event 1/14/10	NAREL	CSN	-----	5.54	-----	232.35	80.86	4.88	4.85
T10-13486	Teflon®	144-hr Event 5/19/10	NAREL	CSN	-----	1.04	-----	175.10	52.51	2.22	2.99
T10-13487	Teflon®	144-hr Event 5/19/10	NAREL	CSN	-----	1.24	-----	166.24	50.97	2.07	2.76
T10-13508	Teflon®	filter blank	NAREL	CSN	-----	ND	-----	ND	-0.01	0.29	0.33
T10-13509	Teflon®	filter blank	NAREL	CSN	-----	ND	-----	ND	-0.01	0.23	0.33
N10-13438	Nylon®	160-hr Event 12/27/09	CARB	CSN	-----	66.20	-----	150.00	63.60	4.15	1.17

Table 12. TOA Carbon PT Results

Sample ID	Sample Description	Lab	Instrument (see text)*	Method	Concentration (µg/cm^2)							
					OC	EC	TC	OC1	OC2	OC3	OC4	PyrolC
Q10-13510	272-hr Event 12/7/09	CARB	1	IMPROVE_A	15.8	4.3	20.0	<0.8	3.6	5.4	3.0	3.6
Q10-13511	272-hr Event 12/7/09	CARB	1	IMPROVE_A	15.0	4.1	19.1	<0.8	3.5	5.1	2.7	3.5
Q10-13512	272-hr Event 12/7/09	DRI	6	IMPROVE_A	9.1 ± 1.1	3.8 ± 0.2	12.9 ± 1.0	0.3 ± 0.1	2.9 ± 0.3	2.6 ± 0.4	1.4 ± 0.1	2.0 ± 0.5
Q10-13512	272-hr Event 12/7/09	DRI	13	IMPROVE_A	9.9 ± 1.2	3.6 ± 0.2	13.5 ± 1.1	0.6 ± 0.3	2.7 ± 0.3	2.8 ± 0.4	1.5 ± 0.2	2.3 ± 0.5
Q10-13513	272-hr Event 12/7/09	DRI	13	IMPROVE_A	10.4 ± 1.2	3.5 ± 0.2	13.9 ± 1.1	0.4 ± 0.2	3.1 ± 0.3	3.0 ± 0.5	1.6 ± 0.2	2.3 ± 0.5
Q10-13513	272-hr Event 12/7/09	DRI	6	IMPROVE_A	10.2 ± 1.2	3.8 ± 0.2	13.9 ± 1.1	0.1 ± 0.1	3.1 ± 0.3	3.5 ± 0.5	1.8 ± 0.2	1.7 ± 0.4
Q10-13514	272-hr Event 12/7/09	RTI	1	IMPROVE_A	10.1 ± 1.1	5.3 ± 0.9	15.4 ± 1.7	0.6 ± 0.6	3.0 ± 0.7	3.5 ± 1.1	2.0 ± 1.7	1.1 ± 1.2
Q10-13514	272-hr Event 12/7/09	RTI	T	IMPROVE_A	10.2 ± 0.8	4.3 ± 0.5	14.6 ± 1.2	0.3 ± 0.5	3.2 ± 0.6	3.2 ± 0.8	1.8 ± 1.3	1.7 ± 1.1
Q10-13515	272-hr Event 12/7/09	RTI	1	IMPROVE_A	10.5 ± 1.1	5.3 ± 0.9	15.7 ± 1.7	0.5 ± 0.6	3.3 ± 0.8	3.5 ± 1.1	1.9 ± 1.6	1.4 ± 1.3
Q10-13515	272-hr Event 12/7/09	RTI	T	IMPROVE_A	10.1 ± 0.8	4.4 ± 0.5	14.6 ± 1.2	0.2 ± 0.5	3.1 ± 0.6	3.3 ± 0.8	1.8 ± 1.3	1.7 ± 1.1
Q10-13516	272-hr Event 12/7/09	AQMD	3	IMPROVE_A	12.9 ± 0.2	4.5 ± 0.2	17.4 ± 0.3	0.7	3.6	4.3	2.3	2.1
Q10-13517	272-hr Event 12/7/09	AQMD	3	IMPROVE_A	12.8 ± 0.3	4.7 ± 0.1	17.5 ± 0.2	0.7	3.7	4.2	2.1	2.2
Q10-13518	272-hr Event 12/7/09	NAREL	2	IMPROVE_A	9.8 ± 0.7	4.4 ± 0.4	14.2 ± 1.0	0.5	2.8	2.3	1.1	3.2
Q10-13519	272-hr Event 12/7/09	NAREL	2	IMPROVE_A	10.0 ± 0.7	4.2 ± 0.4	14.2 ± 1.0	0.5	2.8	2.3	1.1	3.3
Q10-13522	226-hr Event 4/27/10	CARB	1	IMPROVE_A	15.9	3.4	19.3	<0.8	4.6	4.8	2.4	3.8
Q10-13523	226-hr Event 4/27/10	CARB	1	IMPROVE_A	16.2	3.5	19.7	<0.8	4.7	4.8	2.5	3.8
Q10-13524	226-hr Event 4/27/10	DRI	6	IMPROVE_A	9.5 ± 1.1	3.2 ± 0.2	12.7 ± 1.0	0.2 ± 0.1	2.7 ± 0.3	3.0 ± 0.5	1.8 ± 0.2	1.8 ± 0.4
Q10-13524	226-hr Event 4/27/10	DRI	13	IMPROVE_A	9.3 ± 1.1	2.8 ± 0.2	12.1 ± 1.0	0.3 ± 0.1	2.8 ± 0.3	2.9 ± 0.4	1.7 ± 0.2	1.7 ± 0.4
Q10-13525	226-hr Event 4/27/10	DRI	13	IMPROVE_A	9.7 ± 1.2	2.6 ± 0.2	12.3 ± 1.0	0.0 ± 0.0	2.7 ± 0.3	2.9 ± 0.4	1.8 ± 0.2	2.4 ± 0.5
Q10-13525	226-hr Event 4/27/10	DRI	6	IMPROVE_A	9.2 ± 1.1	2.6 ± 0.2	11.8 ± 1.0	0.1 ± 0.1	2.4 ± 0.3	3.0 ± 0.5	2.0 ± 0.2	1.6 ± 0.4
Q10-13526	226-hr Event 4/27/10	RTI	1	IMPROVE_A	9.9 ± 1.1	4.3 ± 0.8	14.2 ± 1.6	0.3 ± 0.6	2.9 ± 0.7	3.0 ± 1.0	2.0 ± 1.7	1.8 ± 1.4
Q10-13526	226-hr Event 4/27/10	RTI	T	IMPROVE_A	11.1 ± 0.9	3.6 ± 0.5	14.7 ± 1.2	0.2 ± 0.5	3.1 ± 0.6	4.2 ± 0.8	2.1 ± 1.4	1.6 ± 1.1
Q10-13527	226-hr Event 4/27/10	RTI	1	IMPROVE_A	9.8 ± 1.1	4.2 ± 0.8	14.0 ± 1.6	0.3 ± 0.6	3.0 ± 0.7	3.2 ± 1.1	2.0 ± 1.7	1.3 ± 1.3
Q10-13527	226-hr Event 4/27/10	RTI	T	IMPROVE_A	10.9 ± 0.8	3.5 ± 0.5	14.4 ± 1.2	0.1 ± 0.5	3.0 ± 0.6	4.0 ± 0.8	2.1 ± 1.4	1.6 ± 1.1
Q10-13528	226-hr Event 4/27/10	AQMD	3	IMPROVE_A	14.0 ± 0.3	4.0 ± 0.0	17.9 ± 0.3	0.5	3.6	5.0	3.0	2.0
Q10-13529	226-hr Event 4/27/10	AQMD	3	IMPROVE_A	13.3 ± 0.1	4.1 ± 0.0	17.4 ± 0.1	0.4	3.7	4.7	2.7	1.8
Q10-13530	226-hr Event 4/27/10	NAREL	2	IMPROVE_A	10.8 ± 0.7	3.2 ± 0.4	13.9 ± 1.0	0.2	3.0	2.4	1.3	3.8
Q10-13531	226-hr Event 4/27/10	NAREL	2	IMPROVE_A	10.0 ± 0.7	2.9 ± 0.3	13.0 ± 0.9	0.2	2.7	2.4	1.2	3.5
Q10-13537	filter blank	CARB	1	IMPROVE_A	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Q10-13538	filter blank	CARB	1	IMPROVE_A	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Q10-13539	filter blank	DRI	6	IMPROVE_A	0.4 ± 0.3	0.0 ± 0.1	0.4 ± 0.3	0.0 ± 0.0	0.0 ± 0.1	0.4 ± 0.2	0.0 ± 0.1	0.0 ± 0.1

Table 12. TOA Carbon PT Results

Sample ID	Sample Description	Lab	Instrument (see text)*	Method	Concentration (µg/cm^2)							
					OC	EC	TC	OC1	OC2	OC3	OC4	PyrolC
Q10-13539	filter blank	DRI	13	IMPROVE_A	0.3 ± 0.3	0.1 ± 0.1	0.4 ± 0.3	0.0 ± 0.0	0.0 ± 0.1	0.3 ± 0.2	0.0 ± 0.1	0.0 ± 0.1
Q10-13540	filter blank	DRI	13	IMPROVE_A	0.2 ± 0.3	0.0 ± 0.1	0.2 ± 0.3	0.1 ± 0.0	0.0 ± 0.1	0.1 ± 0.2	0.0 ± 0.1	0.0 ± 0.1
Q10-13540	filter blank	DRI	6	IMPROVE_A	0.2 ± 0.3	0.0 ± 0.1	0.2 ± 0.3	0.0 ± 0.0	0.0 ± 0.1	0.1 ± 0.2	0.0 ± 0.1	0.0 ± 0.1
Q10-13541	filter blank	RTI	1	IMPROVE_A	9.9 ± 1.1	4.3 ± 0.8	14.2 ± 1.6	0.3 ± 0.6	2.9 ± 0.7	3.0 ± 1.0	2.0 ± 1.7	1.8 ± 1.4
Q10-13541	filter blank	RTI	T	IMPROVE_A	11.1 ± 0.9	3.6 ± 0.5	14.7 ± 1.2	0.2 ± 0.5	3.1 ± 0.6	4.2 ± 0.8	2.1 ± 1.4	1.6 ± 1.1
Q10-13542	filter blank	RTI	1	IMPROVE_A	9.8 ± 1.1	4.2 ± 0.8	14.0 ± 1.6	0.3 ± 0.6	3.0 ± 0.7	3.2 ± 1.1	2.0 ± 1.7	1.3 ± 1.3
Q10-13542	filter blank	RTI	T	IMPROVE_A	10.9 ± 0.8	3.5 ± 0.5	14.4 ± 1.2	0.1 ± 0.5	3.0 ± 0.6	4.0 ± 0.8	2.1 ± 1.4	1.6 ± 1.1
Q10-13543	filter blank	AQMD	3	IMPROVE_A	0.6 ± 0.0	0.0 ± N/A	0.6 ± 0.0	0.1	0.2	0.3	0.0	0.0
Q10-13544	filter blank	AQMD	3	IMPROVE_A	0.4 ± 0.0	0.0 ± N/A	0.4 ± 0.0	0.1	0.2	0.2	0.0	0.0
Q10-13545	filter blank	NAREL	2	IMPROVE_A	0.4 ± 0.2	-0.1 ± 0.2	0.3 ± 0.3	0.2	0.2	0.1	0.0	0.0
Q10-13546	filter blank	NAREL	2	IMPROVE_A	0.1 ± 0.2	-0.1 ± 0.2	0.1 ± 0.3	0.1	0.0	0.0	0.0	0.0
Q10-13514	272-hr Event 12/7/09	RTI	T	CSN	12.6 ± 0.9	1.6 ± 0.4	14.2 ± 1.2	0.1 ± 0.3	4.6 ± 0.5	2.0 ± 0.6	4.0 ± 0.8	1.9 ± 3.0
Q10-13514	272-hr Event 12/7/09	RTI	R	CSN	13.2 ± 1.0	1.7 ± 0.4	14.9 ± 1.2	2.9 ± 0.4	2.3 ± 0.4	1.2 ± 0.5	1.5 ± 0.6	5.3 ± 7.8
Q10-13515	272-hr Event 12/7/09	RTI	T	CSN	13.8 ± 1.0	1.7 ± 0.4	15.5 ± 1.2	0.1 ± 0.3	5.1 ± 0.6	2.1 ± 0.6	4.2 ± 0.9	2.3 ± 3.5
Q10-13515	272-hr Event 12/7/09	RTI	R	CSN	13.1 ± 1.0	1.9 ± 0.4	15.0 ± 1.2	2.8 ± 0.4	2.2 ± 0.4	1.3 ± 0.5	1.5 ± 0.6	5.3 ± 7.7
Q10-13518	272-hr Event 12/7/09	NAREL	1	CSN	13.2 ± 0.9	1.3 ± 0.3	14.5 ± 1.0	3.7	1.4	1.1	1.3	5.7
Q10-13519	272-hr Event 12/7/09	NAREL	1	CSN	13.3 ± 0.9	1.1 ± 0.3	14.4 ± 1.0	3.7	1.4	0.9	1.2	6.1
Q10-13526	226-hr Event 4/27/10	RTI	T	CSN	12.1 ± 0.9	1.7 ± 0.4	13.8 ± 1.1	0.0 ± 0.3	4.4 ± 0.5	2.1 ± 0.6	5.1 ± 1.0	0.4 ± 0.9
Q10-13526	226-hr Event 4/27/10	RTI	R	CSN	11.6 ± 0.9	2.1 ± 0.4	13.7 ± 1.1	2.1 ± 0.4	2.5 ± 0.4	1.2 ± 0.5	1.7 ± 0.6	4.0 ± 5.9
Q10-13527	226-hr Event 4/27/10	RTI	T	CSN	11.5 ± 0.9	1.6 ± 0.4	13.1 ± 1.1	0.0 ± 0.3	4.2 ± 0.5	2.2 ± 0.6	4.7 ± 0.9	0.4 ± 0.9
Q10-13527	226-hr Event 4/27/10	RTI	R	CSN	11.4 ± 0.9	1.9 ± 0.4	13.3 ± 1.1	1.8 ± 0.4	2.5 ± 0.4	1.3 ± 0.5	1.8 ± 0.6	4.0 ± 5.9
Q10-13530	226-hr Event 4/27/10	NAREL	1	CSN	13.4 ± 0.9	1.3 ± 0.3	14.7 ± 1.0	3.4	1.7	1.2	1.8	5.3
Q10-13531	226-hr Event 4/27/10	NAREL	1	CSN	12.8 ± 0.8	1.0 ± 0.3	13.8 ± 1.0	3.3	1.5	1.1	1.6	5.2
Q10-13541	filter blank	RTI	T	CSN	0.3 ± 0.3	0.0 ± 0.3	0.3 ± 0.5	0.0 ± 0.3	0.2 ± 0.3	0.0 ± 0.5	0.1 ± 0.5	0.0 ± 0.3
Q10-13541	filter blank	RTI	R	CSN	0.3 ± 0.3	0.0 ± 0.3	0.3 ± 0.5	0.0 ± 0.3	0.1 ± 0.3	0.1 ± 0.5	0.0 ± 0.5	0.0 ± 0.3
Q10-13542	filter blank	RTI	T	CSN	0.3 ± 0.3	0.0 ± 0.3	0.3 ± 0.5	0.0 ± 0.3	0.0 ± 0.3	0.2 ± 0.5	0.0 ± 0.5	0.0 ± 0.3
Q10-13542	filter blank	RTI	R	CSN	0.2 ± 0.3	0.0 ± 0.3	0.2 ± 0.5	0.0 ± 0.3	0.1 ± 0.3	0.1 ± 0.5	0.0 ± 0.5	0.0 ± 0.3
Q10-13545	filter blank	NAREL	1	CSN	0.1 ± 0.2	0.0 ± 0.2	0.1 ± 0.3	0.1	0.0	0.0	0.0	0.0
Q10-13546	filter blank	NAREL	1	CSN	0.1 ± 0.2	0.0 ± 0.2	0.1 ± 0.3	0.0	0.0	0.0	0.0	0.0

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
126-hr event	T10-13325	CARB	Na	11	-----	-----	-----	2.347	0.219	0.303	-----
126-hr event	T10-13325	CARB	Mg	12	-----	-----	-----	0.214	0.043	0.114	-----
126-hr event	T10-13325	CARB	Al	13	0.700	0.210	0.200	0.362	0.116	0.129	-----
126-hr event	T10-13325	CARB	Si	14	4.450	0.254	0.060	4.351	0.300	0.093	4.420
126-hr event	T10-13325	CARB	P	15	<0.04	-----	0.040	0.000	0.071	0.155	-----
126-hr event	T10-13325	CARB	S	16	36.570	1.836	0.050	33.358	1.675	0.095	34.403
126-hr event	T10-13325	CARB	Cl	17	0.270	0.040	0.060	0.298	0.031	0.075	-----
126-hr event	T10-13325	CARB	K	19	3.520	0.180	0.070	3.469	0.176	0.070	3.333
126-hr event	T10-13325	CARB	Ca	20	1.830	0.096	0.060	1.712	0.088	0.073	1.743
126-hr event	T10-13325	CARB	Ti	22	0.080	0.025	0.040	0.097	0.023	0.051	-----
126-hr event	T10-13325	CARB	V	23	<0.03	-----	0.030	0.033	0.015	0.037	-----
126-hr event	T10-13325	CARB	Cr	24	<0.03	-----	0.030	0.000	0.008	0.025	-----
126-hr event	T10-13325	CARB	Mn	25	0.130	0.012	0.030	0.131	0.011	0.018	-----
126-hr event	T10-13325	CARB	Fe	26	2.230	0.115	0.040	2.220	0.113	0.016	2.320
126-hr event	T10-13325	CARB	Co	27	<0.03	-----	0.030	0.000	0.007	0.013	-----
126-hr event	T10-13325	CARB	Ni	28	<0.03	-----	0.030	0.007	0.004	0.012	-----
126-hr event	T10-13325	CARB	Cu	29	0.130	0.019	0.040	0.090	0.008	0.016	-----
126-hr event	T10-13325	CARB	Zn	30	0.680	0.046	0.020	0.647	0.035	0.017	0.650
126-hr event	T10-13325	CARB	As	33	0.070	0.015	0.020	0.031	0.018	0.009	-----
126-hr event	T10-13325	CARB	Se	34	0.050	0.010	0.020	0.055	0.011	0.013	-----
126-hr event	T10-13325	CARB	Br	35	0.230	0.018	0.020	0.253	0.021	0.013	0.230
126-hr event	T10-13325	CARB	Rb	37	<0.02	-----	0.020	0.012	0.011	0.019	-----
126-hr event	T10-13325	CARB	Sr	38	<0.03	-----	0.030	0.000	0.081	0.023	-----
126-hr event	T10-13325	CARB	Zr	40	-----	-----	-----	0.000	0.085	0.032	-----
126-hr event	T10-13325	CARB	Ag	47	-----	-----	-----	0.000	0.046	0.126	-----
126-hr event	T10-13325	CARB	Cd	48	-----	-----	-----	0.000	0.048	0.166	-----
126-hr event	T10-13325	CARB	In	49	-----	-----	-----	0.000	0.069	0.154	-----
126-hr event	T10-13325	CARB	Sn	50	<0.20	-----	0.200	0.000	0.086	0.196	-----
126-hr event	T10-13325	CARB	Sb	51	0.260	0.147	0.200	0.000	0.100	0.377	-----
126-hr event	T10-13325	CARB	Cs	55	-----	-----	-----	0.000	0.039	0.110	-----
126-hr event	T10-13325	CARB	Ba	56	0.240	0.059	0.200	0.000	0.032	0.105	-----
126-hr event	T10-13325	CARB	Ce	58	-----	-----	-----	0.000	0.026	0.094	-----
126-hr event	T10-13325	CARB	Pb	82	0.090	0.026	0.030	0.120	0.031	0.025	-----
126-hr event	T10-13326	CARB	Na	11	-----	-----	-----	2.441	0.224	0.303	-----
126-hr event	T10-13326	CARB	Mg	12	-----	-----	-----	0.267	0.045	0.114	-----
126-hr event	T10-13326	CARB	Al	13	0.690	0.203	0.200	0.081	0.109	0.129	-----
126-hr event	T10-13326	CARB	Si	14	4.110	0.237	0.060	3.946	0.273	0.093	4.420
126-hr event	T10-13326	CARB	P	15	<0.04	-----	0.040	0.000	0.065	0.155	-----
126-hr event	T10-13326	CARB	S	16	32.580	1.637	0.050	29.211	1.467	0.095	34.403
126-hr event	T10-13326	CARB	Cl	17	0.240	0.036	0.060	0.184	0.028	0.075	-----
126-hr event	T10-13326	CARB	K	19	3.130	0.160	0.070	3.059	0.156	0.070	3.333
126-hr event	T10-13326	CARB	Ca	20	1.690	0.089	0.060	1.479	0.077	0.073	1.743
126-hr event	T10-13326	CARB	Ti	22	0.100	0.025	0.040	0.133	0.024	0.051	-----

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
126-hr event	T10-13326	CARB	V	23	<0.03	-----	0.030	0.016	0.015	0.037	-----
126-hr event	T10-13326	CARB	Cr	24	<0.03	-----	0.030	0.017	0.009	0.025	-----
126-hr event	T10-13326	CARB	Mn	25	0.110	0.011	0.030	0.110	0.010	0.018	-----
126-hr event	T10-13326	CARB	Fe	26	2.060	0.107	0.040	2.016	0.103	0.016	2.320
126-hr event	T10-13326	CARB	Co	27	<0.03	-----	0.030	0.000	0.007	0.013	-----
126-hr event	T10-13326	CARB	Ni	28	<0.03	-----	0.030	0.008	0.004	0.012	-----
126-hr event	T10-13326	CARB	Cu	29	0.100	0.018	0.040	0.081	0.008	0.016	-----
126-hr event	T10-13326	CARB	Zn	30	0.580	0.042	0.020	0.566	0.030	0.017	0.650
126-hr event	T10-13326	CARB	As	33	0.030	0.015	0.020	0.061	0.018	0.009	-----
126-hr event	T10-13326	CARB	Se	34	0.050	0.009	0.020	0.027	0.010	0.013	-----
126-hr event	T10-13326	CARB	Br	35	0.190	0.016	0.020	0.208	0.019	0.013	0.230
126-hr event	T10-13326	CARB	Rb	37	<0.02	-----	0.020	0.000	0.006	0.019	-----
126-hr event	T10-13326	CARB	Sr	38	<0.03	-----	0.030	0.000	0.081	0.023	-----
126-hr event	T10-13326	CARB	Zr	40	-----	-----	-----	0.000	0.085	0.032	-----
126-hr event	T10-13326	CARB	Ag	47	-----	-----	-----	0.000	0.046	0.126	-----
126-hr event	T10-13326	CARB	Cd	48	-----	-----	-----	0.000	0.048	0.166	-----
126-hr event	T10-13326	CARB	In	49	-----	-----	-----	0.000	0.050	0.154	-----
126-hr event	T10-13326	CARB	Sn	50	<0.20	-----	0.200	0.203	0.362	0.196	-----
126-hr event	T10-13326	CARB	Sb	51	<0.20	-----	0.200	0.057	0.463	0.377	-----
126-hr event	T10-13326	CARB	Cs	55	-----	-----	-----	0.000	0.039	0.110	-----
126-hr event	T10-13326	CARB	Ba	56	<0.20	-----	0.200	0.000	0.032	0.105	-----
126-hr event	T10-13326	CARB	Ce	58	-----	-----	-----	0.000	0.026	0.094	-----
126-hr event	T10-13326	CARB	Pb	82	0.140	0.024	0.030	0.044	0.031	0.025	-----
126-hr event	T10-13327	DRI	Na	11	6.891	1.926	0.734	2.547	0.233	0.303	-----
126-hr event	T10-13327	DRI	Mg	12	0.000	0.519	0.503	0.304	0.046	0.114	-----
126-hr event	T10-13327	DRI	Al	13	0.446	0.106	0.151	0.217	0.112	0.129	-----
126-hr event	T10-13327	DRI	Si	14	3.704	0.074	0.077	3.856	0.268	0.093	4.420
126-hr event	T10-13327	DRI	P	15	0.000	0.017	0.013	0.000	0.068	0.155	-----
126-hr event	T10-13327	DRI	S	16	41.782	0.158	0.012	33.053	1.659	0.095	34.403
126-hr event	T10-13327	DRI	Cl	17	0.131	0.017	0.032	0.211	0.029	0.075	-----
126-hr event	T10-13327	DRI	K	19	3.480	0.027	0.018	3.383	0.172	0.070	3.333
126-hr event	T10-13327	DRI	Ca	20	1.578	0.073	0.032	1.425	0.074	0.073	1.743
126-hr event	T10-13327	DRI	Ti	22	0.079	0.025	0.026	0.092	0.023	0.051	-----
126-hr event	T10-13327	DRI	V	23	0.000	0.017	0.004	0.032	0.016	0.037	-----
126-hr event	T10-13327	DRI	Cr	24	0.023	0.017	0.006	0.021	0.009	0.025	-----
126-hr event	T10-13327	DRI	Mn	25	0.083	0.051	0.015	0.111	0.011	0.018	-----
126-hr event	T10-13327	DRI	Fe	26	2.389	0.021	0.021	1.976	0.101	0.016	2.320
126-hr event	T10-13327	DRI	Co	27	0.000	0.017	0.004	0.000	0.007	0.013	-----
126-hr event	T10-13327	DRI	Ni	28	0.002	0.048	0.005	0.007	0.004	0.012	-----
126-hr event	T10-13327	DRI	Cu	29	0.100	0.060	0.015	0.075	0.008	0.016	-----
126-hr event	T10-13327	DRI	Zn	30	0.750	0.018	0.013	0.622	0.033	0.017	0.650
126-hr event	T10-13327	DRI	As	33	0.000	0.017	0.006	0.031	0.018	0.009	-----
126-hr event	T10-13327	DRI	Se	34	0.012	0.017	0.040	0.037	0.011	0.013	-----
126-hr event	T10-13327	DRI	Br	35	0.250	0.017	0.011	0.220	0.020	0.013	0.230

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
126-hr event	T10-13327	DRI	Rb	37	0.000	0.017	0.006	0.000	0.006	0.019	-----
126-hr event	T10-13327	DRI	Sr	38	0.046	0.017	0.006	0.001	0.101	0.023	-----
126-hr event	T10-13327	DRI	Zr	40	0.000	0.027	0.023	0.000	0.085	0.032	-----
126-hr event	T10-13327	DRI	Ag	47	0.000	0.038	0.040	0.045	0.147	0.126	-----
126-hr event	T10-13327	DRI	Cd	48	0.000	0.048	0.057	0.000	0.048	0.166	-----
126-hr event	T10-13327	DRI	In	49	0.000	0.052	0.047	0.000	0.050	0.154	-----
126-hr event	T10-13327	DRI	Sn	50	0.000	0.050	0.062	0.000	0.086	0.196	-----
126-hr event	T10-13327	DRI	Sb	51	0.000	0.081	0.071	0.000	0.115	0.377	-----
126-hr event	T10-13327	DRI	Cs	55	0.000	0.166	0.012	0.060	0.062	0.110	-----
126-hr event	T10-13327	DRI	Ba	56	0.000	0.194	0.136	0.000	0.032	0.105	-----
126-hr event	T10-13327	DRI	Ce	58	0.000	0.228	0.138	0.000	0.026	0.094	-----
126-hr event	T10-13327	DRI	Pb	82	0.162	0.019	0.021	0.124	0.033	0.025	-----
126-hr event	T10-13328	DRI	Na	11	10.739	2.036	0.734	2.394	0.221	0.303	-----
126-hr event	T10-13328	DRI	Mg	12	0.000	0.523	0.503	0.356	0.047	0.114	-----
126-hr event	T10-13328	DRI	Al	13	0.603	0.106	0.151	0.081	0.109	0.129	-----
126-hr event	T10-13328	DRI	Si	14	3.654	0.074	0.077	4.085	0.282	0.093	4.420
126-hr event	T10-13328	DRI	P	15	0.000	0.017	0.013	0.000	0.068	0.155	-----
126-hr event	T10-13328	DRI	S	16	39.514	0.150	0.012	32.442	1.629	0.095	34.403
126-hr event	T10-13328	DRI	Cl	17	0.143	0.017	0.032	0.261	0.029	0.075	-----
126-hr event	T10-13328	DRI	K	19	3.343	0.027	0.018	3.383	0.172	0.070	3.333
126-hr event	T10-13328	DRI	Ca	20	1.598	0.073	0.032	1.555	0.080	0.073	1.743
126-hr event	T10-13328	DRI	Ti	22	0.040	0.025	0.026	0.132	0.024	0.051	-----
126-hr event	T10-13328	DRI	V	23	0.003	0.017	0.004	0.014	0.015	0.037	-----
126-hr event	T10-13328	DRI	Cr	24	0.000	0.017	0.006	0.002	0.009	0.025	-----
126-hr event	T10-13328	DRI	Mn	25	0.099	0.051	0.015	0.137	0.011	0.018	-----
126-hr event	T10-13328	DRI	Fe	26	2.333	0.021	0.021	2.075	0.106	0.016	2.320
126-hr event	T10-13328	DRI	Co	27	0.000	0.017	0.004	0.007	0.007	0.013	-----
126-hr event	T10-13328	DRI	Ni	28	0.002	0.048	0.005	0.005	0.004	0.012	-----
126-hr event	T10-13328	DRI	Cu	29	0.080	0.060	0.015	0.089	0.008	0.016	-----
126-hr event	T10-13328	DRI	Zn	30	0.729	0.018	0.013	0.622	0.033	0.017	0.650
126-hr event	T10-13328	DRI	As	33	0.015	0.017	0.006	0.006	0.018	0.009	-----
126-hr event	T10-13328	DRI	Se	34	0.057	0.017	0.040	0.042	0.011	0.013	-----
126-hr event	T10-13328	DRI	Br	35	0.184	0.017	0.011	0.240	0.020	0.013	0.230
126-hr event	T10-13328	DRI	Rb	37	0.000	0.017	0.006	0.000	0.006	0.019	-----
126-hr event	T10-13328	DRI	Sr	38	0.064	0.017	0.006	0.000	0.081	0.023	-----
126-hr event	T10-13328	DRI	Zr	40	0.006	0.028	0.023	0.023	0.113	0.032	-----
126-hr event	T10-13328	DRI	Ag	47	0.000	0.038	0.040	0.000	0.046	0.126	-----
126-hr event	T10-13328	DRI	Cd	48	0.000	0.049	0.057	0.011	0.181	0.166	-----
126-hr event	T10-13328	DRI	In	49	0.000	0.052	0.047	0.000	0.050	0.154	-----
126-hr event	T10-13328	DRI	Sn	50	0.000	0.051	0.062	0.000	0.086	0.196	-----
126-hr event	T10-13328	DRI	Sb	51	0.000	0.082	0.071	0.000	0.100	0.377	-----
126-hr event	T10-13328	DRI	Cs	55	0.000	0.166	0.012	0.000	0.039	0.110	-----
126-hr event	T10-13328	DRI	Ba	56	0.000	0.194	0.136	0.000	0.032	0.105	-----
126-hr event	T10-13328	DRI	Ce	58	0.000	0.229	0.138	0.000	0.026	0.094	-----

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
126-hr event	T10-13328	DRI	Pb	82	0.170	0.019	0.021	0.144	0.032	0.025	-----
126-hr event	T10-13329	ODEQ	Na	11	-----	-----	-----	2.538	0.233	0.303	-----
126-hr event	T10-13329	ODEQ	Mg	12	-----	-----	-----	0.314	0.047	0.114	-----
126-hr event	T10-13329	ODEQ	Al	13	0.650	0.085	0.220	0.336	0.113	0.129	-----
126-hr event	T10-13329	ODEQ	Si	14	5.290	0.464	0.980	4.239	0.292	0.093	4.420
126-hr event	T10-13329	ODEQ	P	15	<0.35	0.118	0.350	0.000	0.068	0.155	-----
126-hr event	T10-13329	ODEQ	S	16	40.600	3.267	6.200	30.996	1.557	0.095	34.403
126-hr event	T10-13329	ODEQ	Cl	17	<0.82	0.274	0.820	0.270	0.029	0.075	-----
126-hr event	T10-13329	ODEQ	K	19	3.450	0.281	0.540	3.266	0.166	0.070	3.333
126-hr event	T10-13329	ODEQ	Ca	20	2.190	0.184	0.370	1.661	0.086	0.073	1.743
126-hr event	T10-13329	ODEQ	Ti	22	0.170	0.051	0.150	0.078	0.024	0.051	-----
126-hr event	T10-13329	ODEQ	V	23	<0.052	0.017	0.052	0.044	0.016	0.037	-----
126-hr event	T10-13329	ODEQ	Cr	24	0.149	0.018	0.045	0.123	0.013	0.025	-----
126-hr event	T10-13329	ODEQ	Mn	25	0.132	0.019	0.051	0.137	0.012	0.018	-----
126-hr event	T10-13329	ODEQ	Fe	26	2.900	0.234	0.440	2.502	0.127	0.016	2.320
126-hr event	T10-13329	ODEQ	Co	27	<0.050	0.017	0.050	0.009	0.008	0.013	-----
126-hr event	T10-13329	ODEQ	Ni	28	0.053	0.009	0.026	0.035	0.005	0.012	-----
126-hr event	T10-13329	ODEQ	Cu	29	0.110	0.015	0.040	0.096	0.008	0.016	-----
126-hr event	T10-13329	ODEQ	Zn	30	0.650	0.054	0.110	0.585	0.031	0.017	0.650
126-hr event	T10-13329	ODEQ	As	33	0.054	0.013	0.037	0.000	0.008	0.009	-----
126-hr event	T10-13329	ODEQ	Se	34	0.040	0.011	0.031	0.025	0.010	0.013	-----
126-hr event	T10-13329	ODEQ	Br	35	0.194	0.018	0.041	0.209	0.019	0.013	0.230
126-hr event	T10-13329	ODEQ	Rb	37	<0.026	0.009	0.026	0.014	0.012	0.019	-----
126-hr event	T10-13329	ODEQ	Sr	38	<0.023	0.008	0.023	0.000	0.081	0.023	-----
126-hr event	T10-13329	ODEQ	Zr	40	<0.030	0.010	0.030	0.000	0.085	0.032	-----
126-hr event	T10-13329	ODEQ	Ag	47	<0.093	0.031	0.093	0.000	0.046	0.126	-----
126-hr event	T10-13329	ODEQ	Cd	48	<0.10	0.034	0.100	0.000	0.048	0.166	-----
126-hr event	T10-13329	ODEQ	In	49	<0.11	0.035	0.110	0.000	0.050	0.154	-----
126-hr event	T10-13329	ODEQ	Sn	50	<0.15	0.049	0.150	0.000	0.086	0.196	-----
126-hr event	T10-13329	ODEQ	Sb	51	<0.13	0.042	0.130	0.000	0.100	0.377	-----
126-hr event	T10-13329	ODEQ	Cs	55	<0.25	0.085	0.250	0.000	0.039	0.110	-----
126-hr event	T10-13329	ODEQ	Ba	56	<0.34	0.113	0.340	0.000	0.032	0.105	-----
126-hr event	T10-13329	ODEQ	Ce	58	<0.55	0.185	0.550	0.000	0.026	0.094	-----
126-hr event	T10-13329	ODEQ	Pb	82	0.097	0.022	0.062	0.149	0.033	0.025	-----
126-hr event	T10-13330	ODEQ	Na	11	-----	-----	-----	2.470	0.228	0.303	-----
126-hr event	T10-13330	ODEQ	Mg	12	-----	-----	-----	0.380	0.049	0.114	-----
126-hr event	T10-13330	ODEQ	Al	13	0.630	0.083	0.220	0.338	0.113	0.129	-----
126-hr event	T10-13330	ODEQ	Si	14	4.810	0.422	0.890	4.016	0.278	0.093	4.420
126-hr event	T10-13330	ODEQ	P	15	<0.34	0.116	0.340	0.000	0.068	0.155	-----
126-hr event	T10-13330	ODEQ	S	16	40.400	3.254	6.200	31.787	1.596	0.095	34.403
126-hr event	T10-13330	ODEQ	Cl	17	<0.81	0.273	0.810	0.237	0.030	0.075	-----
126-hr event	T10-13330	ODEQ	K	19	3.330	0.271	0.520	3.280	0.167	0.070	3.333
126-hr event	T10-13330	ODEQ	Ca	20	1.970	0.167	0.340	1.546	0.080	0.073	1.743
126-hr event	T10-13330	ODEQ	Ti	22	0.170	0.053	0.160	0.071	0.023	0.051	-----

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
126-hr event	T10-13330	ODEQ	V	23	<0.053	0.018	0.053	0.035	0.015	0.037	-----
126-hr event	T10-13330	ODEQ	Cr	24	<0.036	0.012	0.036	0.089	0.012	0.025	-----
126-hr event	T10-13330	ODEQ	Mn	25	0.117	0.018	0.049	0.104	0.011	0.018	-----
126-hr event	T10-13330	ODEQ	Fe	26	2.300	0.186	0.350	2.306	0.118	0.016	2.320
126-hr event	T10-13330	ODEQ	Co	27	<0.044	0.015	0.044	0.006	0.008	0.013	-----
126-hr event	T10-13330	ODEQ	Ni	28	<0.023	0.008	0.023	0.021	0.005	0.012	-----
126-hr event	T10-13330	ODEQ	Cu	29	0.106	0.015	0.039	0.095	0.008	0.016	-----
126-hr event	T10-13330	ODEQ	Zn	30	0.680	0.056	0.110	0.582	0.031	0.017	0.650
126-hr event	T10-13330	ODEQ	As	33	0.060	0.013	0.036	0.068	0.018	0.009	-----
126-hr event	T10-13330	ODEQ	Se	34	0.049	0.011	0.031	0.028	0.011	0.013	-----
126-hr event	T10-13330	ODEQ	Br	35	0.208	0.019	0.043	0.258	0.020	0.013	0.230
126-hr event	T10-13330	ODEQ	Rb	37	<0.027	0.009	0.027	0.012	0.012	0.019	-----
126-hr event	T10-13330	ODEQ	Sr	38	<0.023	0.008	0.023	0.000	0.081	0.023	-----
126-hr event	T10-13330	ODEQ	Zr	40	<0.030	0.010	0.030	0.000	0.085	0.032	-----
126-hr event	T10-13330	ODEQ	Ag	47	<0.091	0.031	0.091	0.000	0.046	0.126	-----
126-hr event	T10-13330	ODEQ	Cd	48	<0.100	0.033	0.100	0.000	0.048	0.166	-----
126-hr event	T10-13330	ODEQ	In	49	<0.10	0.034	0.100	0.000	0.050	0.154	-----
126-hr event	T10-13330	ODEQ	Sn	50	<0.14	0.048	0.140	0.079	0.373	0.196	-----
126-hr event	T10-13330	ODEQ	Sb	51	<0.12	0.041	0.120	0.362	0.486	0.377	-----
126-hr event	T10-13330	ODEQ	Cs	55	<0.25	0.083	0.250	0.000	0.039	0.110	-----
126-hr event	T10-13330	ODEQ	Ba	56	<0.33	0.110	0.330	0.000	0.032	0.105	-----
126-hr event	T10-13330	ODEQ	Ce	58	<0.54	0.179	0.540	0.000	0.026	0.094	-----
126-hr event	T10-13330	ODEQ	Pb	82	0.081	0.021	0.062	0.087	0.032	0.025	-----
126-hr event	T10-13331	AQMD	Na	11	-----	-----	-----	2.573	0.236	0.303	-----
126-hr event	T10-13331	AQMD	Mg	12	0.488	0.042	0.295	0.398	0.050	0.114	-----
126-hr event	T10-13331	AQMD	Al	13	1.034	0.090	0.555	0.305	0.115	0.129	-----
126-hr event	T10-13331	AQMD	Si	14	4.549	0.394	0.165	4.537	0.311	0.093	4.420
126-hr event	T10-13331	AQMD	P	15	0.539	0.047	0.035	0.000	0.071	0.155	-----
126-hr event	T10-13331	AQMD	S	16	33.795	2.927	0.106	34.601	1.737	0.095	34.403
126-hr event	T10-13331	AQMD	Cl	17	ND	-----	0.059	0.261	0.030	0.075	-----
126-hr event	T10-13331	AQMD	K	19	2.671	0.231	0.059	3.595	0.182	0.070	3.333
126-hr event	T10-13331	AQMD	Ca	20	2.018	0.175	0.094	1.633	0.084	0.073	1.743
126-hr event	T10-13331	AQMD	Ti	22	0.106	0.009	0.094	0.088	0.023	0.051	-----
126-hr event	T10-13331	AQMD	V	23	ND	-----	0.094	0.034	0.015	0.037	-----
126-hr event	T10-13331	AQMD	Cr	24	ND	-----	0.071	0.000	0.008	0.025	-----
126-hr event	T10-13331	AQMD	Mn	25	0.138	0.012	0.094	0.125	0.011	0.018	-----
126-hr event	T10-13331	AQMD	Fe	26	2.049	0.177	0.071	2.278	0.116	0.016	2.320
126-hr event	T10-13331	AQMD	Co	27	-----	-----	-----	0.003	0.008	0.013	-----
126-hr event	T10-13331	AQMD	Ni	28	ND	-----	0.059	0.001	0.004	0.012	-----
126-hr event	T10-13331	AQMD	Cu	29	ND	-----	0.059	0.098	0.008	0.016	-----
126-hr event	T10-13331	AQMD	Zn	30	0.649	0.056	0.035	0.626	0.033	0.017	0.650
126-hr event	T10-13331	AQMD	As	33	ND	-----	0.083	0.035	0.018	0.009	-----
126-hr event	T10-13331	AQMD	Se	34	ND	-----	0.177	0.059	0.011	0.013	-----
126-hr event	T10-13331	AQMD	Br	35	0.275	0.024	0.094	0.272	0.022	0.013	0.230

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
126-hr event	T10-13331	AQMD	Rb	37	ND	-----	0.083	0.000	0.006	0.019	-----
126-hr event	T10-13331	AQMD	Sr	38	ND	-----	0.083	0.000	0.081	0.023	-----
126-hr event	T10-13331	AQMD	Zr	40	ND	-----	0.083	0.000	0.085	0.032	-----
126-hr event	T10-13331	AQMD	Ag	47	ND	-----	0.212	0.000	0.046	0.126	-----
126-hr event	T10-13331	AQMD	Cd	48	ND	-----	0.201	0.045	0.192	0.166	-----
126-hr event	T10-13331	AQMD	In	49	ND	-----	0.236	0.000	0.069	0.154	-----
126-hr event	T10-13331	AQMD	Sn	50	ND	-----	0.319	0.034	0.350	0.196	-----
126-hr event	T10-13331	AQMD	Sb	51	ND	-----	0.307	0.000	0.100	0.377	-----
126-hr event	T10-13331	AQMD	Cs	55	ND	-----	0.661	0.000	0.039	0.110	-----
126-hr event	T10-13331	AQMD	Ba	56	ND	-----	0.791	0.000	0.032	0.105	-----
126-hr event	T10-13331	AQMD	Ce	58	-----	-----	-----	0.000	0.026	0.094	-----
126-hr event	T10-13331	AQMD	Pb	82	ND	N/A	0.295	0.108	0.033	0.025	-----
126-hr event	T10-13332	AQMD	Na	11	-----	-----	-----	2.307	0.215	0.303	-----
126-hr event	T10-13332	AQMD	Mg	12	0.454	0.039	0.295	0.338	0.047	0.114	-----
126-hr event	T10-13332	AQMD	Al	13	1.031	0.089	0.555	0.414	0.112	0.129	-----
126-hr event	T10-13332	AQMD	Si	14	4.059	0.352	0.165	4.445	0.305	0.093	4.420
126-hr event	T10-13332	AQMD	P	15	0.500	0.043	0.035	0.000	0.068	0.155	-----
126-hr event	T10-13332	AQMD	S	16	31.219	2.704	0.106	33.086	1.661	0.095	34.403
126-hr event	T10-13332	AQMD	Cl	17	ND	-----	0.059	0.184	0.028	0.075	-----
126-hr event	T10-13332	AQMD	K	19	2.474	0.214	0.059	3.430	0.174	0.070	3.333
126-hr event	T10-13332	AQMD	Ca	20	1.860	0.161	0.094	1.489	0.077	0.073	1.743
126-hr event	T10-13332	AQMD	Ti	22	0.102	0.009	0.094	0.089	0.023	0.051	-----
126-hr event	T10-13332	AQMD	V	23	ND	-----	0.094	0.011	0.015	0.037	-----
126-hr event	T10-13332	AQMD	Cr	24	ND	-----	0.071	0.016	0.009	0.025	-----
126-hr event	T10-13332	AQMD	Mn	25	0.134	0.012	0.094	0.102	0.010	0.018	-----
126-hr event	T10-13332	AQMD	Fe	26	1.923	0.167	0.071	2.035	0.104	0.016	2.320
126-hr event	T10-13332	AQMD	Co	27	-----	-----	-----	0.000	0.007	0.013	-----
126-hr event	T10-13332	AQMD	Ni	28	ND	-----	0.059	0.001	0.004	0.012	-----
126-hr event	T10-13332	AQMD	Cu	29	ND	-----	0.059	0.088	0.008	0.016	-----
126-hr event	T10-13332	AQMD	Zn	30	0.625	0.054	0.035	0.614	0.033	0.017	0.650
126-hr event	T10-13332	AQMD	As	33	ND	-----	0.083	0.033	0.018	0.009	-----
126-hr event	T10-13332	AQMD	Se	34	ND	-----	0.177	0.056	0.011	0.013	-----
126-hr event	T10-13332	AQMD	Br	35	0.264	0.023	0.094	0.251	0.021	0.013	0.230
126-hr event	T10-13332	AQMD	Rb	37	ND	-----	0.083	0.000	0.006	0.019	-----
126-hr event	T10-13332	AQMD	Sr	38	ND	-----	0.083	0.095	0.105	0.023	-----
126-hr event	T10-13332	AQMD	Zr	40	ND	-----	0.083	0.000	0.085	0.032	-----
126-hr event	T10-13332	AQMD	Ag	47	ND	-----	0.212	0.000	0.046	0.126	-----
126-hr event	T10-13332	AQMD	Cd	48	ND	-----	0.201	0.023	0.181	0.166	-----
126-hr event	T10-13332	AQMD	In	49	ND	-----	0.236	0.124	0.249	0.154	-----
126-hr event	T10-13332	AQMD	Sn	50	ND	-----	0.319	0.000	0.086	0.196	-----
126-hr event	T10-13332	AQMD	Sb	51	ND	-----	0.307	0.215	0.463	0.377	-----
126-hr event	T10-13332	AQMD	Cs	55	ND	-----	0.661	0.000	0.039	0.110	-----
126-hr event	T10-13332	AQMD	Ba	56	ND	-----	0.791	0.000	0.032	0.105	-----
126-hr event	T10-13332	AQMD	Ce	58	-----	-----	-----	0.000	0.026	0.094	-----

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
126-hr event	T10-13332	AQMD	Pb	82	ND	-----	0.295	0.113	0.032	0.025	-----
126-hr event	T10-13333	UCD	Na	11	0.000	0.000	1.633	2.157	0.205	0.303	-----
126-hr event	T10-13333	UCD	Mg	12	0.000	0.000	0.548	0.206	0.043	0.114	-----
126-hr event	T10-13333	UCD	Al	13	1.560	0.224	0.277	0.408	0.114	0.129	-----
126-hr event	T10-13333	UCD	Si	14	6.004	0.352	0.152	4.050	0.280	0.093	4.420
126-hr event	T10-13333	UCD	P	15	0.000	0.000	0.094	0.000	0.068	0.155	-----
126-hr event	T10-13333	UCD	S	16	31.985	1.620	0.060	32.759	1.645	0.095	34.403
126-hr event	T10-13333	UCD	Cl	17	0.000	0.000	0.040	0.186	0.028	0.075	-----
126-hr event	T10-13333	UCD	K	19	2.773	0.146	0.023	3.336	0.169	0.070	3.333
126-hr event	T10-13333	UCD	Ca	20	1.670	0.089	0.012	1.568	0.081	0.073	1.743
126-hr event	T10-13333	UCD	Ti	22	0.095	0.008	0.006	0.105	0.023	0.051	-----
126-hr event	T10-13333	UCD	V	23	0.013	0.004	0.005	0.000	0.011	0.037	-----
126-hr event	T10-13333	UCD	Cr	24	0.156	0.010	0.004	0.146	0.014	0.025	-----
126-hr event	T10-13333	UCD	Mn	25	0.100	0.008	0.005	0.097	0.011	0.018	-----
126-hr event	T10-13333	UCD	Fe	26	2.458	0.125	0.007	2.387	0.122	0.016	2.320
126-hr event	T10-13333	UCD	Co	27	-----	-----	-----	0.000	0.007	0.013	-----
126-hr event	T10-13333	UCD	Ni	28	0.045	0.005	0.007	0.036	0.005	0.012	-----
126-hr event	T10-13333	UCD	Cu	29	0.104	0.008	0.006	0.116	0.009	0.016	-----
126-hr event	T10-13333	UCD	Zn	30	0.585	0.031	0.005	0.623	0.033	0.017	0.650
126-hr event	T10-13333	UCD	As	33	0.029	0.008	0.015	0.026	0.017	0.009	-----
126-hr event	T10-13333	UCD	Se	34	0.050	0.004	0.004	0.050	0.011	0.013	-----
126-hr event	T10-13333	UCD	Br	35	0.205	0.012	0.004	0.229	0.020	0.013	0.230
126-hr event	T10-13333	UCD	Rb	37	0.012	0.006	0.008	0.000	0.006	0.019	-----
126-hr event	T10-13333	UCD	Sr	38	0.000	0.000	0.011	0.000	0.081	0.023	-----
126-hr event	T10-13333	UCD	Zr	40	0.020	0.008	0.020	0.000	0.085	0.032	-----
126-hr event	T10-13333	UCD	Ag	47	-----	-----	-----	0.034	0.147	0.126	-----
126-hr event	T10-13333	UCD	Cd	48	-----	-----	-----	0.000	0.048	0.166	-----
126-hr event	T10-13333	UCD	In	49	-----	-----	-----	0.000	0.050	0.154	-----
126-hr event	T10-13333	UCD	Sn	50	-----	-----	-----	0.000	0.086	0.196	-----
126-hr event	T10-13333	UCD	Sb	51	-----	-----	-----	0.000	0.100	0.377	-----
126-hr event	T10-13333	UCD	Cs	55	-----	-----	-----	0.000	0.039	0.110	-----
126-hr event	T10-13333	UCD	Ba	56	-----	-----	-----	0.000	0.032	0.105	-----
126-hr event	T10-13333	UCD	Ce	58	-----	-----	-----	0.000	0.026	0.094	-----
126-hr event	T10-13333	UCD	Pb	82	0.119	0.013	0.008	0.118	0.031	0.025	-----
126-hr event	T10-13334	UCD	Na	11	6.012	1.132	1.648	2.321	0.218	0.303	-----
126-hr event	T10-13334	UCD	Mg	12	0.000	0.000	0.551	0.284	0.046	0.114	-----
126-hr event	T10-13334	UCD	Al	13	0.000	0.000	0.280	0.396	0.116	0.129	-----
126-hr event	T10-13334	UCD	Si	14	6.511	0.388	0.155	4.395	0.302	0.093	4.420
126-hr event	T10-13334	UCD	P	15	0.000	0.000	0.096	0.000	0.071	0.155	-----
126-hr event	T10-13334	UCD	S	16	34.623	1.752	0.061	34.205	1.717	0.095	34.403
126-hr event	T10-13334	UCD	Cl	17	0.000	0.000	0.040	0.224	0.029	0.075	-----
126-hr event	T10-13334	UCD	K	19	3.070	0.161	0.023	3.549	0.180	0.070	3.333
126-hr event	T10-13334	UCD	Ca	20	1.961	0.105	0.012	1.658	0.086	0.073	1.743
126-hr event	T10-13334	UCD	Ti	22	0.111	0.010	0.006	0.098	0.023	0.051	-----

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
126-hr event	T10-13334	UCD	V	23	0.025	0.007	0.005	0.000	0.011	0.037	-----
126-hr event	T10-13334	UCD	Cr	24	0.007	0.003	0.004	0.000	0.008	0.025	-----
126-hr event	T10-13334	UCD	Mn	25	0.116	0.009	0.005	0.112	0.011	0.018	-----
126-hr event	T10-13334	UCD	Fe	26	2.175	0.111	0.007	2.137	0.109	0.016	2.320
126-hr event	T10-13334	UCD	Co	27	-----	-----	-----	0.008	0.008	0.013	-----
126-hr event	T10-13334	UCD	Ni	28	0.000	0.000	0.006	0.003	0.004	0.012	-----
126-hr event	T10-13334	UCD	Cu	29	0.098	0.007	0.005	0.099	0.008	0.016	-----
126-hr event	T10-13334	UCD	Zn	30	0.633	0.034	0.005	0.651	0.035	0.017	0.650
126-hr event	T10-13334	UCD	As	33	0.039	0.008	0.015	0.000	0.008	0.009	-----
126-hr event	T10-13334	UCD	Se	34	0.059	0.005	0.004	0.062	0.011	0.013	-----
126-hr event	T10-13334	UCD	Br	35	0.225	0.013	0.005	0.277	0.022	0.013	0.230
126-hr event	T10-13334	UCD	Rb	37	0.014	0.005	0.008	0.000	0.006	0.019	-----
126-hr event	T10-13334	UCD	Sr	38	0.022	0.005	0.011	0.000	0.081	0.023	-----
126-hr event	T10-13334	UCD	Zr	40	0.067	0.016	0.020	0.000	0.085	0.032	-----
126-hr event	T10-13334	UCD	Ag	47	-----	-----	-----	0.000	0.046	0.126	-----
126-hr event	T10-13334	UCD	Cd	48	-----	-----	-----	0.045	0.181	0.166	-----
126-hr event	T10-13334	UCD	In	49	-----	-----	-----	0.000	0.069	0.154	-----
126-hr event	T10-13334	UCD	Sn	50	-----	-----	-----	0.000	0.086	0.196	-----
126-hr event	T10-13334	UCD	Sb	51	-----	-----	-----	0.396	0.464	0.377	-----
126-hr event	T10-13334	UCD	Cs	55	-----	-----	-----	0.000	0.039	0.110	-----
126-hr event	T10-13334	UCD	Ba	56	-----	-----	-----	0.000	0.032	0.105	-----
126-hr event	T10-13334	UCD	Ce	58	-----	-----	-----	0.000	0.026	0.094	-----
126-hr event	T10-13334	UCD	Pb	82	0.108	0.013	0.008	0.158	0.022	0.025	-----
162-hr event	T10-13340	CARB	Na	11	-----	-----	-----	5.594	0.476	0.303	-----
162-hr event	T10-13340	CARB	Mg	12	-----	-----	-----	1.209	0.097	0.114	-----
162-hr event	T10-13340	CARB	Al	13	3.110	0.304	0.200	2.893	0.244	0.129	3.120
162-hr event	T10-13340	CARB	Si	14	16.730	0.861	0.060	16.747	1.111	0.093	4.420
162-hr event	T10-13340	CARB	P	15	<0.04	-----	0.040	0.000	0.077	0.155	-----
162-hr event	T10-13340	CARB	S	16	47.780	2.397	0.050	43.731	2.194	0.095	34.403
162-hr event	T10-13340	CARB	Cl	17	0.340	0.044	0.060	0.276	0.032	0.075	-----
162-hr event	T10-13340	CARB	K	19	5.000	0.254	0.070	4.956	0.250	0.070	3.333
162-hr event	T10-13340	CARB	Ca	20	3.190	0.164	0.060	2.944	0.149	0.073	1.743
162-hr event	T10-13340	CARB	Ti	22	0.280	0.033	0.040	0.262	0.029	0.051	0.299
162-hr event	T10-13340	CARB	V	23	0.050	0.019	0.030	0.063	0.016	0.037	-----
162-hr event	T10-13340	CARB	Cr	24	0.040	0.010	0.030	0.023	0.010	0.025	-----
162-hr event	T10-13340	CARB	Mn	25	0.110	0.011	0.030	0.120	0.011	0.018	-----
162-hr event	T10-13340	CARB	Fe	26	3.630	0.185	0.040	3.573	0.181	0.016	2.320
162-hr event	T10-13340	CARB	Co	27	<0.03	-----	0.030	0.008	0.009	0.013	-----
162-hr event	T10-13340	CARB	Ni	28	<0.03	-----	0.030	0.014	0.004	0.012	-----
162-hr event	T10-13340	CARB	Cu	29	0.140	0.020	0.040	0.122	0.009	0.016	-----
162-hr event	T10-13340	CARB	Zn	30	0.630	0.044	0.020	0.619	0.033	0.017	0.650
162-hr event	T10-13340	CARB	As	33	0.040	0.019	0.020	0.002	0.021	0.009	-----
162-hr event	T10-13340	CARB	Se	34	0.030	0.009	0.020	0.008	0.010	0.013	-----
162-hr event	T10-13340	CARB	Br	35	0.270	0.020	0.020	0.253	0.022	0.013	0.230

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
162-hr event	T10-13340	CARB	Rb	37	<0.02	-----	0.020	0.003	0.012	0.019	-----
162-hr event	T10-13340	CARB	Sr	38	0.050	0.012	0.030	0.000	0.081	0.023	-----
162-hr event	T10-13340	CARB	Zr	40	-----	-----	-----	0.000	0.085	0.032	-----
162-hr event	T10-13340	CARB	Ag	47	-----	-----	-----	0.000	0.046	0.126	-----
162-hr event	T10-13340	CARB	Cd	48	-----	-----	-----	0.000	0.048	0.166	-----
162-hr event	T10-13340	CARB	In	49	-----	-----	-----	0.057	0.249	0.154	-----
162-hr event	T10-13340	CARB	Sn	50	<0.20	-----	0.200	0.000	0.086	0.196	-----
162-hr event	T10-13340	CARB	Sb	51	<0.20	-----	0.200	0.531	0.464	0.377	-----
162-hr event	T10-13340	CARB	Cs	55	-----	-----	-----	0.000	0.039	0.110	-----
162-hr event	T10-13340	CARB	Ba	56	0.240	0.079	0.200	0.001	0.063	0.105	-----
162-hr event	T10-13340	CARB	Ce	58	-----	-----	-----	0.000	0.026	0.094	-----
162-hr event	T10-13340	CARB	Pb	82	0.290	0.032	0.030	0.322	0.041	0.025	0.279
162-hr event	T10-13341	CARB	Na	11	-----	-----	-----	6.125	0.518	0.303	-----
162-hr event	T10-13341	CARB	Mg	12	-----	-----	-----	1.347	0.106	0.114	-----
162-hr event	T10-13341	CARB	Al	13	3.160	0.303	0.200	2.893	0.244	0.129	3.120
162-hr event	T10-13341	CARB	Si	14	16.870	0.868	0.060	17.074	1.132	0.093	4.420
162-hr event	T10-13341	CARB	P	15	<0.04	-----	0.040	0.000	0.080	0.155	-----
162-hr event	T10-13341	CARB	S	16	47.350	2.375	0.050	45.087	2.263	0.095	34.403
162-hr event	T10-13341	CARB	Cl	17	0.340	0.044	0.060	0.388	0.035	0.075	-----
162-hr event	T10-13341	CARB	K	19	4.990	0.253	0.070	5.137	0.259	0.070	3.333
162-hr event	T10-13341	CARB	Ca	20	3.330	0.170	0.060	3.120	0.158	0.073	1.743
162-hr event	T10-13341	CARB	Ti	22	0.300	0.033	0.040	0.303	0.030	0.051	0.299
162-hr event	T10-13341	CARB	V	23	0.050	0.018	0.030	0.093	0.016	0.037	-----
162-hr event	T10-13341	CARB	Cr	24	0.040	0.010	0.030	0.014	0.011	0.025	-----
162-hr event	T10-13341	CARB	Mn	25	0.110	0.011	0.030	0.115	0.014	0.018	-----
162-hr event	T10-13341	CARB	Fe	26	3.750	0.191	0.040	3.852	0.195	0.016	2.320
162-hr event	T10-13341	CARB	Co	27	0.030	0.012	0.030	0.000	0.009	0.013	-----
162-hr event	T10-13341	CARB	Ni	28	<0.03	-----	0.030	0.010	0.004	0.012	-----
162-hr event	T10-13341	CARB	Cu	29	0.140	0.020	0.040	0.114	0.009	0.016	-----
162-hr event	T10-13341	CARB	Zn	30	0.630	0.044	0.020	0.617	0.033	0.017	0.650
162-hr event	T10-13341	CARB	As	33	0.050	0.019	0.020	0.052	0.022	0.009	-----
162-hr event	T10-13341	CARB	Se	34	0.030	0.009	0.020	0.043	0.010	0.013	-----
162-hr event	T10-13341	CARB	Br	35	0.260	0.020	0.020	0.261	0.021	0.013	0.230
162-hr event	T10-13341	CARB	Rb	37	0.020	0.010	0.020	0.027	0.013	0.019	-----
162-hr event	T10-13341	CARB	Sr	38	0.070	0.012	0.030	0.000	0.081	0.023	-----
162-hr event	T10-13341	CARB	Zr	40	-----	-----	-----	0.000	0.085	0.032	-----
162-hr event	T10-13341	CARB	Ag	47	-----	-----	-----	0.000	0.046	0.126	-----
162-hr event	T10-13341	CARB	Cd	48	-----	-----	-----	0.000	0.048	0.166	-----
162-hr event	T10-13341	CARB	In	49	-----	-----	-----	0.000	0.050	0.154	-----
162-hr event	T10-13341	CARB	Sn	50	<0.20	-----	0.200	0.000	0.086	0.196	-----
162-hr event	T10-13341	CARB	Sb	51	<0.20	-----	0.200	0.576	0.475	0.377	-----
162-hr event	T10-13341	CARB	Cs	55	-----	-----	-----	0.018	0.066	0.110	-----
162-hr event	T10-13341	CARB	Ba	56	0.220	0.079	0.200	0.037	0.083	0.105	-----
162-hr event	T10-13341	CARB	Ce	58	-----	-----	-----	0.000	0.026	0.094	-----

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
162-hr event	T10-13341	CARB	Pb	82	0.280	0.032	0.030	0.234	0.039	0.025	0.279
162-hr event	T10-13342	DRI	Na	11	9.988	2.013	0.734	5.221	0.447	0.303	-----
162-hr event	T10-13342	DRI	Mg	12	0.000	0.517	0.503	1.142	0.093	0.114	-----
162-hr event	T10-13342	DRI	Al	13	2.738	0.114	0.151	2.181	0.200	0.129	3.120
162-hr event	T10-13342	DRI	Si	14	15.950	0.124	0.077	14.860	0.987	0.093	4.420
162-hr event	T10-13342	DRI	P	15	0.000	0.017	0.013	0.000	0.074	0.155	-----
162-hr event	T10-13342	DRI	S	16	50.812	0.190	0.012	42.070	2.111	0.095	34.403
162-hr event	T10-13342	DRI	Cl	17	0.205	0.017	0.032	0.322	0.033	0.075	-----
162-hr event	T10-13342	DRI	K	19	4.483	0.029	0.018	4.591	0.232	0.070	3.333
162-hr event	T10-13342	DRI	Ca	20	2.654	0.076	0.032	2.509	0.128	0.073	1.743
162-hr event	T10-13342	DRI	Ti	22	0.253	0.026	0.026	0.288	0.030	0.051	0.299
162-hr event	T10-13342	DRI	V	23	0.006	0.017	0.004	0.059	0.016	0.037	-----
162-hr event	T10-13342	DRI	Cr	24	0.029	0.017	0.006	0.181	0.015	0.025	-----
162-hr event	T10-13342	DRI	Mn	25	0.114	0.052	0.015	0.117	0.011	0.018	-----
162-hr event	T10-13342	DRI	Fe	26	3.581	0.023	0.021	3.548	0.179	0.016	2.320
162-hr event	T10-13342	DRI	Co	27	0.000	0.017	0.004	0.001	0.009	0.013	-----
162-hr event	T10-13342	DRI	Ni	28	0.014	0.048	0.005	0.052	0.006	0.012	-----
162-hr event	T10-13342	DRI	Cu	29	0.121	0.060	0.015	0.122	0.009	0.016	-----
162-hr event	T10-13342	DRI	Zn	30	0.670	0.018	0.013	0.560	0.030	0.017	0.650
162-hr event	T10-13342	DRI	As	33	0.000	0.017	0.006	0.000	0.010	0.009	-----
162-hr event	T10-13342	DRI	Se	34	0.000	0.017	0.040	0.016	0.009	0.013	-----
162-hr event	T10-13342	DRI	Br	35	0.242	0.017	0.011	0.262	0.021	0.013	0.230
162-hr event	T10-13342	DRI	Rb	37	0.000	0.017	0.006	0.000	0.006	0.019	-----
162-hr event	T10-13342	DRI	Sr	38	0.059	0.017	0.006	0.053	0.109	0.023	-----
162-hr event	T10-13342	DRI	Zr	40	0.000	0.028	0.023	0.000	0.085	0.032	-----
162-hr event	T10-13342	DRI	Ag	47	0.007	0.038	0.040	0.000	0.046	0.126	-----
162-hr event	T10-13342	DRI	Cd	48	0.000	0.048	0.057	0.000	0.048	0.166	-----
162-hr event	T10-13342	DRI	In	49	0.000	0.052	0.047	0.215	0.260	0.154	-----
162-hr event	T10-13342	DRI	Sn	50	0.000	0.051	0.062	0.520	0.351	0.196	-----
162-hr event	T10-13342	DRI	Sb	51	0.000	0.081	0.071	0.000	0.100	0.377	-----
162-hr event	T10-13342	DRI	Cs	55	0.000	0.166	0.012	0.000	0.039	0.110	-----
162-hr event	T10-13342	DRI	Ba	56	0.000	0.191	0.136	0.000	0.045	0.105	-----
162-hr event	T10-13342	DRI	Ce	58	0.000	0.229	0.138	0.072	0.048	0.094	-----
162-hr event	T10-13342	DRI	Pb	82	0.367	0.019	0.021	0.277	0.027	0.025	0.279
162-hr event	T10-13343	DRI	Na	11	6.249	1.908	0.734	6.102	0.517	0.303	-----
162-hr event	T10-13343	DRI	Mg	12	0.000	0.514	0.503	1.220	0.098	0.114	-----
162-hr event	T10-13343	DRI	Al	13	2.790	0.114	0.151	3.130	0.256	0.129	3.120
162-hr event	T10-13343	DRI	Si	14	17.031	0.128	0.077	16.961	1.125	0.093	4.420
162-hr event	T10-13343	DRI	P	15	0.000	0.017	0.013	0.000	0.077	0.155	-----
162-hr event	T10-13343	DRI	S	16	52.672	0.197	0.012	44.127	2.215	0.095	34.403
162-hr event	T10-13343	DRI	Cl	17	0.184	0.017	0.032	0.307	0.033	0.075	-----
162-hr event	T10-13343	DRI	K	19	4.766	0.029	0.018	5.095	0.257	0.070	3.333
162-hr event	T10-13343	DRI	Ca	20	3.123	0.076	0.032	2.998	0.152	0.073	1.743
162-hr event	T10-13343	DRI	Ti	22	0.327	0.026	0.026	0.270	0.029	0.051	0.299

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
162-hr event	T10-13343	DRI	V	23	0.053	0.017	0.004	0.052	0.016	0.037	-----
162-hr event	T10-13343	DRI	Cr	24	0.029	0.017	0.006	0.039	0.011	0.025	-----
162-hr event	T10-13343	DRI	Mn	25	0.110	0.051	0.015	0.109	0.011	0.018	-----
162-hr event	T10-13343	DRI	Fe	26	4.107	0.024	0.021	3.658	0.185	0.016	2.320
162-hr event	T10-13343	DRI	Co	27	0.000	0.017	0.004	0.000	0.009	0.013	-----
162-hr event	T10-13343	DRI	Ni	28	0.021	0.048	0.005	0.018	0.004	0.012	-----
162-hr event	T10-13343	DRI	Cu	29	0.176	0.060	0.015	0.130	0.009	0.016	-----
162-hr event	T10-13343	DRI	Zn	30	0.740	0.018	0.013	0.619	0.033	0.017	0.650
162-hr event	T10-13343	DRI	As	33	0.009	0.017	0.006	0.026	0.020	0.009	-----
162-hr event	T10-13343	DRI	Se	34	0.034	0.017	0.040	0.010	0.009	0.013	-----
162-hr event	T10-13343	DRI	Br	35	0.277	0.017	0.011	0.285	0.023	0.013	0.230
162-hr event	T10-13343	DRI	Rb	37	0.000	0.017	0.006	0.023	0.012	0.019	-----
162-hr event	T10-13343	DRI	Sr	38	0.045	0.017	0.006	0.000	0.081	0.023	-----
162-hr event	T10-13343	DRI	Zr	40	0.000	0.027	0.023	0.000	0.085	0.032	-----
162-hr event	T10-13343	DRI	Ag	47	0.000	0.038	0.040	0.000	0.046	0.126	-----
162-hr event	T10-13343	DRI	Cd	48	0.000	0.048	0.057	0.000	0.048	0.166	-----
162-hr event	T10-13343	DRI	In	49	0.000	0.052	0.047	0.000	0.050	0.154	-----
162-hr event	T10-13343	DRI	Sn	50	0.030	0.051	0.062	0.000	0.086	0.196	-----
162-hr event	T10-13343	DRI	Sb	51	0.000	0.081	0.071	0.000	0.100	0.377	-----
162-hr event	T10-13343	DRI	Cs	55	0.000	0.166	0.012	0.000	0.039	0.110	-----
162-hr event	T10-13343	DRI	Ba	56	0.000	0.192	0.136	0.000	0.045	0.105	-----
162-hr event	T10-13343	DRI	Ce	58	0.120	0.231	0.138	0.061	0.044	0.094	-----
162-hr event	T10-13343	DRI	Pb	82	0.327	0.019	0.021	0.250	0.039	0.025	0.279
162-hr event	T10-13344	ODEQ	Na	11	-----	-----	-----	5.820	0.494	0.303	-----
162-hr event	T10-13344	ODEQ	Mg	12	-----	-----	-----	1.228	0.099	0.114	-----
162-hr event	T10-13344	ODEQ	Al	13	3.180	0.291	0.640	3.028	0.251	0.129	3.120
162-hr event	T10-13344	ODEQ	Si	14	18.500	1.616	3.400	16.984	1.126	0.093	4.420
162-hr event	T10-13344	ODEQ	P	15	<0.48	0.163	0.480	0.000	0.080	0.155	-----
162-hr event	T10-13344	ODEQ	S	16	56.600	4.548	8.600	46.590	2.338	0.095	34.403
162-hr event	T10-13344	ODEQ	Cl	17	<1.1	0.378	1.100	0.407	0.036	0.075	-----
162-hr event	T10-13344	ODEQ	K	19	5.120	0.414	0.790	5.196	0.262	0.070	3.333
162-hr event	T10-13344	ODEQ	Ca	20	3.700	0.304	0.590	2.932	0.149	0.073	1.743
162-hr event	T10-13344	ODEQ	Ti	22	0.320	0.058	0.170	0.271	0.030	0.051	0.299
162-hr event	T10-13344	ODEQ	V	23	<0.056	0.019	0.056	0.089	0.018	0.037	-----
162-hr event	T10-13344	ODEQ	Cr	24	<0.037	0.013	0.037	0.036	0.010	0.025	-----
162-hr event	T10-13344	ODEQ	Mn	25	0.118	0.018	0.050	0.100	0.011	0.018	-----
162-hr event	T10-13344	ODEQ	Fe	26	4.000	0.322	0.610	3.615	0.183	0.016	2.320
162-hr event	T10-13344	ODEQ	Co	27	<0.064	0.021	0.064	0.005	0.009	0.013	-----
162-hr event	T10-13344	ODEQ	Ni	28	<0.024	0.008	0.024	0.012	0.004	0.012	-----
162-hr event	T10-13344	ODEQ	Cu	29	0.123	0.016	0.041	0.136	0.010	0.016	-----
162-hr event	T10-13344	ODEQ	Zn	30	0.720	0.059	0.120	0.618	0.033	0.017	0.650
162-hr event	T10-13344	ODEQ	As	33	0.071	0.017	0.051	0.011	0.021	0.009	-----
162-hr event	T10-13344	ODEQ	Se	34	<0.030	0.010	0.030	0.015	0.010	0.013	-----
162-hr event	T10-13344	ODEQ	Br	35	0.265	0.024	0.050	0.299	0.023	0.013	0.230

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
162-hr event	T10-13344	ODEQ	Rb	37	<0.028	0.009	0.028	0.001	0.012	0.019	-----
162-hr event	T10-13344	ODEQ	Sr	38	0.041	0.009	0.024	0.000	0.081	0.023	-----
162-hr event	T10-13344	ODEQ	Zr	40	<0.030	0.010	0.030	0.000	0.085	0.032	-----
162-hr event	T10-13344	ODEQ	Ag	47	<0.093	0.031	0.093	0.000	0.046	0.126	-----
162-hr event	T10-13344	ODEQ	Cd	48	<0.10	0.034	0.100	0.045	0.192	0.166	-----
162-hr event	T10-13344	ODEQ	In	49	<0.10	0.034	0.100	0.000	0.069	0.154	-----
162-hr event	T10-13344	ODEQ	Sn	50	<0.14	0.048	0.140	0.000	0.086	0.196	-----
162-hr event	T10-13344	ODEQ	Sb	51	<0.12	0.041	0.120	0.000	0.100	0.377	-----
162-hr event	T10-13344	ODEQ	Cs	55	<0.25	0.083	0.250	0.012	0.067	0.110	-----
162-hr event	T10-13344	ODEQ	Ba	56	<0.33	0.111	0.330	0.040	0.083	0.105	-----
162-hr event	T10-13344	ODEQ	Ce	58	<0.54	0.179	0.540	0.061	0.045	0.094	-----
162-hr event	T10-13344	ODEQ	Pb	82	0.228	0.028	0.072	0.316	0.042	0.025	0.279
162-hr event	T10-13345	ODEQ	Na	11	-----	-----	-----	5.740	0.488	0.303	-----
162-hr event	T10-13345	ODEQ	Mg	12	-----	-----	-----	1.292	0.102	0.114	-----
162-hr event	T10-13345	ODEQ	Al	13	3.170	0.290	0.640	2.667	0.232	0.129	3.120
162-hr event	T10-13345	ODEQ	Si	14	19.200	1.677	3.500	17.199	1.140	0.093	4.420
162-hr event	T10-13345	ODEQ	P	15	<0.49	0.168	0.490	0.000	0.077	0.155	-----
162-hr event	T10-13345	ODEQ	S	16	58.300	4.687	8.900	46.093	2.313	0.095	34.403
162-hr event	T10-13345	ODEQ	Cl	17	<1.2	0.390	1.200	0.398	0.035	0.075	-----
162-hr event	T10-13345	ODEQ	K	19	5.250	0.425	0.810	5.110	0.258	0.070	3.333
162-hr event	T10-13345	ODEQ	Ca	20	3.760	0.310	0.600	2.897	0.147	0.073	1.743
162-hr event	T10-13345	ODEQ	Ti	22	0.340	0.058	0.160	0.241	0.029	0.051	0.299
162-hr event	T10-13345	ODEQ	V	23	<0.056	0.019	0.056	0.073	0.016	0.037	-----
162-hr event	T10-13345	ODEQ	Cr	24	<0.037	0.013	0.037	0.009	0.010	0.025	-----
162-hr event	T10-13345	ODEQ	Mn	25	0.119	0.018	0.050	0.103	0.012	0.018	-----
162-hr event	T10-13345	ODEQ	Fe	26	4.090	0.329	0.620	3.604	0.182	0.016	2.320
162-hr event	T10-13345	ODEQ	Co	27	<0.065	0.022	0.065	0.001	0.009	0.013	-----
162-hr event	T10-13345	ODEQ	Ni	28	<0.024	0.008	0.024	0.009	0.004	0.012	-----
162-hr event	T10-13345	ODEQ	Cu	29	0.134	0.016	0.041	0.123	0.009	0.016	-----
162-hr event	T10-13345	ODEQ	Zn	30	0.750	0.062	0.120	0.661	0.035	0.017	0.650
162-hr event	T10-13345	ODEQ	As	33	0.065	0.018	0.053	0.049	0.022	0.009	-----
162-hr event	T10-13345	ODEQ	Se	34	<0.030	0.010	0.030	0.040	0.010	0.013	-----
162-hr event	T10-13345	ODEQ	Br	35	0.287	0.025	0.052	0.304	0.024	0.013	0.230
162-hr event	T10-13345	ODEQ	Rb	37	<0.027	0.009	0.027	0.010	0.012	0.019	-----
162-hr event	T10-13345	ODEQ	Sr	38	<0.022	0.008	0.022	0.000	0.081	0.023	-----
162-hr event	T10-13345	ODEQ	Zr	40	<0.029	0.010	0.029	0.000	0.085	0.032	-----
162-hr event	T10-13345	ODEQ	Ag	47	<0.091	0.030	0.091	0.000	0.046	0.126	-----
162-hr event	T10-13345	ODEQ	Cd	48	<0.10	0.033	0.100	0.000	0.048	0.166	-----
162-hr event	T10-13345	ODEQ	In	49	<0.10	0.034	0.100	0.000	0.069	0.154	-----
162-hr event	T10-13345	ODEQ	Sn	50	<0.14	0.048	0.140	0.011	0.362	0.196	-----
162-hr event	T10-13345	ODEQ	Sb	51	<0.12	0.040	0.120	0.011	0.463	0.377	-----
162-hr event	T10-13345	ODEQ	Cs	55	<0.24	0.081	0.240	0.000	0.039	0.110	-----
162-hr event	T10-13345	ODEQ	Ba	56	<0.32	0.109	0.320	0.000	0.045	0.105	-----
162-hr event	T10-13345	ODEQ	Ce	58	<0.53	0.175	0.530	0.000	0.026	0.094	-----

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
162-hr event	T10-13345	ODEQ	Pb	82	0.252	0.029	0.073	0.263	0.041	0.025	0.279
162-hr event	T10-13346	AQMD	Na	11	-----	-----	-----	5.650	0.481	0.303	-----
162-hr event	T10-13346	AQMD	Mg	12	1.986	0.172	0.295	1.061	0.089	0.114	-----
162-hr event	T10-13346	AQMD	Al	13	4.460	0.386	0.555	2.633	0.230	0.129	3.120
162-hr event	T10-13346	AQMD	Si	14	18.377	1.591	0.165	16.148	1.071	0.093	4.420
162-hr event	T10-13346	AQMD	P	15	0.606	0.052	0.035	0.000	0.077	0.155	-----
162-hr event	T10-13346	AQMD	S	16	45.627	3.951	0.106	44.081	2.212	0.095	34.403
162-hr event	T10-13346	AQMD	Cl	17	ND	-----	0.059	0.368	0.034	0.075	-----
162-hr event	T10-13346	AQMD	K	19	3.949	0.342	0.059	4.856	0.245	0.070	3.333
162-hr event	T10-13346	AQMD	Ca	20	3.186	0.276	0.094	2.692	0.137	0.073	1.743
162-hr event	T10-13346	AQMD	Ti	22	0.283	0.025	0.094	0.299	0.029	0.051	0.299
162-hr event	T10-13346	AQMD	V	23	ND	-----	0.094	0.032	0.016	0.037	-----
162-hr event	T10-13346	AQMD	Cr	24	ND	-----	0.071	0.038	0.010	0.025	-----
162-hr event	T10-13346	AQMD	Mn	25	0.118	0.010	0.094	0.102	0.010	0.018	-----
162-hr event	T10-13346	AQMD	Fe	26	3.438	0.298	0.071	3.411	0.173	0.016	2.320
162-hr event	T10-13346	AQMD	Co	27	-----	-----	-----	0.004	0.008	0.013	-----
162-hr event	T10-13346	AQMD	Ni	28	ND	-----	0.059	0.016	0.004	0.012	-----
162-hr event	T10-13346	AQMD	Cu	29	ND	-----	0.059	0.103	0.008	0.016	-----
162-hr event	T10-13346	AQMD	Zn	30	0.633	0.055	0.035	0.622	0.033	0.017	0.650
162-hr event	T10-13346	AQMD	As	33	ND	-----	0.083	0.044	0.020	0.009	-----
162-hr event	T10-13346	AQMD	Se	34	ND	-----	0.177	0.006	0.009	0.013	-----
162-hr event	T10-13346	AQMD	Br	35	0.295	0.026	0.094	0.294	0.023	0.013	0.230
162-hr event	T10-13346	AQMD	Rb	37	ND	-----	0.083	0.008	0.012	0.019	-----
162-hr event	T10-13346	AQMD	Sr	38	ND	-----	0.083	0.000	0.081	0.023	-----
162-hr event	T10-13346	AQMD	Zr	40	ND	-----	0.083	0.000	0.085	0.032	-----
162-hr event	T10-13346	AQMD	Ag	47	ND	-----	0.212	0.147	0.147	0.126	-----
162-hr event	T10-13346	AQMD	Cd	48	ND	-----	0.201	0.011	0.158	0.166	-----
162-hr event	T10-13346	AQMD	In	49	ND	-----	0.236	0.000	0.050	0.154	-----
162-hr event	T10-13346	AQMD	Sn	50	ND	-----	0.319	0.000	0.086	0.196	-----
162-hr event	T10-13346	AQMD	Sb	51	ND	-----	0.307	0.000	0.100	0.377	-----
162-hr event	T10-13346	AQMD	Cs	55	ND	-----	0.661	0.031	0.063	0.110	-----
162-hr event	T10-13346	AQMD	Ba	56	ND	-----	0.791	0.000	0.045	0.105	-----
162-hr event	T10-13346	AQMD	Ce	58	-----	-----	-----	0.000	0.026	0.094	-----
162-hr event	T10-13346	AQMD	Pb	82	0.319	0.028	0.295	0.258	0.037	0.025	0.279
162-hr event	T10-13347	AQMD	Na	11	-----	-----	-----	5.356	0.457	0.303	-----
162-hr event	T10-13347	AQMD	Mg	12	2.002	0.173	0.295	1.208	0.098	0.114	-----
162-hr event	T10-13347	AQMD	Al	13	4.626	0.401	0.555	2.814	0.239	0.129	3.120
162-hr event	T10-13347	AQMD	Si	14	19.360	1.677	0.165	16.848	1.117	0.093	4.420
162-hr event	T10-13347	AQMD	P	15	0.657	0.057	0.035	0.000	0.080	0.155	-----
162-hr event	T10-13347	AQMD	S	16	47.180	4.086	0.106	46.861	2.351	0.095	34.403
162-hr event	T10-13347	AQMD	Cl	17	ND	-----	0.059	0.344	0.034	0.075	-----
162-hr event	T10-13347	AQMD	K	19	4.106	0.356	0.059	5.138	0.259	0.070	3.333
162-hr event	T10-13347	AQMD	Ca	20	3.304	0.286	0.094	2.822	0.143	0.073	1.743
162-hr event	T10-13347	AQMD	Ti	22	0.307	0.027	0.094	0.298	0.030	0.051	0.299

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
162-hr event	T10-13347	AQMD	V	23	ND	-----	0.094	0.077	0.016	0.037	-----
162-hr event	T10-13347	AQMD	Cr	24	ND	-----	0.071	0.039	0.010	0.025	-----
162-hr event	T10-13347	AQMD	Mn	25	0.236	0.020	0.094	0.105	0.011	0.018	-----
162-hr event	T10-13347	AQMD	Fe	26	3.457	0.299	0.071	3.510	0.178	0.016	2.320
162-hr event	T10-13347	AQMD	Co	27	-----	-----	-----	0.000	0.008	0.013	-----
162-hr event	T10-13347	AQMD	Ni	28	ND	-----	0.059	0.017	0.004	0.012	-----
162-hr event	T10-13347	AQMD	Cu	29	ND	-----	0.059	0.131	0.010	0.016	-----
162-hr event	T10-13347	AQMD	Zn	30	0.673	0.058	0.035	0.690	0.037	0.017	0.650
162-hr event	T10-13347	AQMD	As	33	ND	-----	0.083	0.023	0.021	0.009	-----
162-hr event	T10-13347	AQMD	Se	34	ND	-----	0.177	0.000	0.006	0.013	-----
162-hr event	T10-13347	AQMD	Br	35	0.336	0.029	0.094	0.295	0.023	0.013	0.230
162-hr event	T10-13347	AQMD	Rb	37	ND	-----	0.083	0.017	0.012	0.019	-----
162-hr event	T10-13347	AQMD	Sr	38	ND	-----	0.083	0.000	0.081	0.023	-----
162-hr event	T10-13347	AQMD	Zr	40	ND	-----	0.083	0.000	0.085	0.032	-----
162-hr event	T10-13347	AQMD	Ag	47	ND	-----	0.212	0.000	0.046	0.126	-----
162-hr event	T10-13347	AQMD	Cd	48	ND	-----	0.201	0.000	0.048	0.166	-----
162-hr event	T10-13347	AQMD	In	49	ND	-----	0.236	0.011	0.249	0.154	-----
162-hr event	T10-13347	AQMD	Sn	50	ND	-----	0.319	0.000	0.086	0.196	-----
162-hr event	T10-13347	AQMD	Sb	51	ND	-----	0.307	0.000	0.100	0.377	-----
162-hr event	T10-13347	AQMD	Cs	55	ND	-----	0.661	0.000	0.039	0.110	-----
162-hr event	T10-13347	AQMD	Ba	56	ND	-----	0.791	0.000	0.045	0.105	-----
162-hr event	T10-13347	AQMD	Ce	58	-----	-----	-----	0.000	0.026	0.094	-----
162-hr event	T10-13347	AQMD	Pb	82	0.342	0.030	0.295	0.299	0.040	0.025	0.279
162-hr event	T10-13348	UCD	Na	11	11.286	1.964	1.940	5.831	0.495	0.303	-----
162-hr event	T10-13348	UCD	Mg	12	0.000	0.000	0.643	1.302	0.103	0.114	-----
162-hr event	T10-13348	UCD	Al	13	4.700	0.377	0.323	2.836	0.240	0.129	3.120
162-hr event	T10-13348	UCD	Si	14	20.937	1.090	0.177	15.978	1.060	0.093	4.420
162-hr event	T10-13348	UCD	P	15	0.000	0.000	0.108	0.000	0.077	0.155	-----
162-hr event	T10-13348	UCD	S	16	43.831	2.212	0.068	42.093	2.112	0.095	34.403
162-hr event	T10-13348	UCD	Cl	17	0.000	0.000	0.044	0.306	0.033	0.075	-----
162-hr event	T10-13348	UCD	K	19	4.248	0.220	0.024	4.695	0.237	0.070	3.333
162-hr event	T10-13348	UCD	Ca	20	3.235	0.168	0.013	2.784	0.141	0.073	1.743
162-hr event	T10-13348	UCD	Ti	22	0.267	0.017	0.007	0.197	0.028	0.051	0.299
162-hr event	T10-13348	UCD	V	23	0.032	0.006	0.005	0.086	0.016	0.037	-----
162-hr event	T10-13348	UCD	Cr	24	0.065	0.007	0.004	0.039	0.011	0.025	-----
162-hr event	T10-13348	UCD	Mn	25	0.104	0.009	0.005	0.106	0.011	0.018	-----
162-hr event	T10-13348	UCD	Fe	26	3.770	0.191	0.008	3.472	0.176	0.016	2.320
162-hr event	T10-13348	UCD	Co	27	-----	-----	-----	0.011	0.009	0.013	-----
162-hr event	T10-13348	UCD	Ni	28	0.021	0.004	0.007	0.029	0.005	0.012	-----
162-hr event	T10-13348	UCD	Cu	29	0.118	0.008	0.006	0.114	0.009	0.016	-----
162-hr event	T10-13348	UCD	Zn	30	0.590	0.032	0.005	0.596	0.032	0.017	0.650
162-hr event	T10-13348	UCD	As	33	0.035	0.009	0.018	0.029	0.022	0.009	-----
162-hr event	T10-13348	UCD	Se	34	0.034	0.004	0.004	0.014	0.010	0.013	-----
162-hr event	T10-13348	UCD	Br	35	0.255	0.014	0.005	0.257	0.021	0.013	0.230

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
162-hr event	T10-13348	UCD	Rb	37	0.013	0.005	0.008	0.000	0.006	0.019	-----
162-hr event	T10-13348	UCD	Sr	38	0.050	0.007	0.011	0.079	0.109	0.023	-----
162-hr event	T10-13348	UCD	Zr	40	0.000	0.000	0.020	0.000	0.085	0.032	-----
162-hr event	T10-13348	UCD	Ag	47	-----	-----	-----	0.090	0.158	0.126	-----
162-hr event	T10-13348	UCD	Cd	48	-----	-----	-----	0.000	0.048	0.166	-----
162-hr event	T10-13348	UCD	In	49	-----	-----	-----	0.068	0.260	0.154	-----
162-hr event	T10-13348	UCD	Sn	50	-----	-----	-----	0.000	0.086	0.196	-----
162-hr event	T10-13348	UCD	Sb	51	-----	-----	-----	0.520	0.475	0.377	-----
162-hr event	T10-13348	UCD	Cs	55	-----	-----	-----	0.000	0.039	0.110	-----
162-hr event	T10-13348	UCD	Ba	56	-----	-----	-----	0.051	0.063	0.105	-----
162-hr event	T10-13348	UCD	Ce	58	-----	-----	-----	0.000	0.026	0.094	-----
162-hr event	T10-13348	UCD	Pb	82	0.275	0.020	0.008	0.264	0.040	0.025	0.279
162-hr event	T10-13349	UCD	Na	11	8.452	1.555	1.950	6.260	0.532	0.303	-----
162-hr event	T10-13349	UCD	Mg	12	1.887	0.371	0.645	1.339	0.105	0.114	-----
162-hr event	T10-13349	UCD	Al	13	4.547	0.347	0.324	2.384	0.217	0.129	3.120
162-hr event	T10-13349	UCD	Si	14	21.818	1.137	0.177	17.888	1.185	0.093	4.420
162-hr event	T10-13349	UCD	P	15	0.000	0.000	0.108	0.000	0.077	0.155	-----
162-hr event	T10-13349	UCD	S	16	45.384	2.289	0.067	46.172	2.317	0.095	34.403
162-hr event	T10-13349	UCD	Cl	17	0.000	0.000	0.043	0.348	0.034	0.075	-----
162-hr event	T10-13349	UCD	K	19	4.489	0.232	0.024	5.163	0.261	0.070	3.333
162-hr event	T10-13349	UCD	Ca	20	3.381	0.175	0.012	3.080	0.156	0.073	1.743
162-hr event	T10-13349	UCD	Ti	22	0.299	0.019	0.006	0.279	0.029	0.051	0.299
162-hr event	T10-13349	UCD	V	23	0.039	0.007	0.005	0.088	0.016	0.037	-----
162-hr event	T10-13349	UCD	Cr	24	0.026	0.004	0.004	0.024	0.010	0.025	-----
162-hr event	T10-13349	UCD	Mn	25	0.104	0.008	0.005	0.090	0.012	0.018	-----
162-hr event	T10-13349	UCD	Fe	26	3.719	0.188	0.007	3.697	0.187	0.016	2.320
162-hr event	T10-13349	UCD	Co	27	-----	-----	-----	0.000	0.009	0.013	-----
162-hr event	T10-13349	UCD	Ni	28	0.013	0.003	0.007	0.009	0.004	0.012	-----
162-hr event	T10-13349	UCD	Cu	29	0.122	0.008	0.006	0.122	0.009	0.016	-----
162-hr event	T10-13349	UCD	Zn	30	0.617	0.033	0.005	0.644	0.034	0.017	0.650
162-hr event	T10-13349	UCD	As	33	0.044	0.009	0.018	0.001	0.021	0.009	-----
162-hr event	T10-13349	UCD	Se	34	0.034	0.004	0.004	0.027	0.010	0.013	-----
162-hr event	T10-13349	UCD	Br	35	0.271	0.015	0.004	0.275	0.023	0.013	0.230
162-hr event	T10-13349	UCD	Rb	37	0.017	0.006	0.008	0.025	0.012	0.019	-----
162-hr event	T10-13349	UCD	Sr	38	0.031	0.005	0.010	0.000	0.081	0.023	-----
162-hr event	T10-13349	UCD	Zr	40	0.028	0.010	0.019	0.000	0.085	0.032	-----
162-hr event	T10-13349	UCD	Ag	47	-----	-----	-----	0.000	0.046	0.126	-----
162-hr event	T10-13349	UCD	Cd	48	-----	-----	-----	0.000	0.048	0.166	-----
162-hr event	T10-13349	UCD	In	49	-----	-----	-----	0.000	0.050	0.154	-----
162-hr event	T10-13349	UCD	Sn	50	-----	-----	-----	0.000	0.086	0.196	-----
162-hr event	T10-13349	UCD	Sb	51	-----	-----	-----	0.000	0.100	0.377	-----
162-hr event	T10-13349	UCD	Cs	55	-----	-----	-----	0.000	0.039	0.110	-----
162-hr event	T10-13349	UCD	Ba	56	-----	-----	-----	0.098	0.082	0.105	-----
162-hr event	T10-13349	UCD	Ce	58	-----	-----	-----	0.072	0.043	0.094	-----

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
162-hr event	T10-13349	UCD	Pb	82	0.266	0.019	0.008	0.304	0.041	0.025	0.279
blank filter	T10-13356	CARB	Na	11	-----	-----	-----	0.000	0.100	0.303	-----
blank filter	T10-13356	CARB	Mg	12	-----	-----	-----	0.000	0.032	0.114	-----
blank filter	T10-13356	CARB	Al	13	<0.20	-----	0.200	0.000	0.085	0.129	-----
blank filter	T10-13356	CARB	Si	14	<0.06	-----	0.060	0.000	0.042	0.093	-----
blank filter	T10-13356	CARB	P	15	<0.04	-----	0.040	0.000	0.031	0.155	-----
blank filter	T10-13356	CARB	S	16	<0.05	-----	0.050	0.000	0.021	0.095	-----
blank filter	T10-13356	CARB	Cl	17	<0.06	-----	0.060	0.000	0.019	0.075	-----
blank filter	T10-13356	CARB	K	19	<0.07	-----	0.070	0.000	0.017	0.070	-----
blank filter	T10-13356	CARB	Ca	20	<0.06	-----	0.060	0.000	0.017	0.073	-----
blank filter	T10-13356	CARB	Ti	22	<0.04	-----	0.040	0.000	0.013	0.051	-----
blank filter	T10-13356	CARB	V	23	<0.03	-----	0.030	0.017	0.014	0.037	-----
blank filter	T10-13356	CARB	Cr	24	<0.03	-----	0.030	0.000	0.008	0.025	-----
blank filter	T10-13356	CARB	Mn	25	<0.03	-----	0.030	0.003	0.007	0.018	-----
blank filter	T10-13356	CARB	Fe	26	<0.04	-----	0.040	0.011	0.007	0.016	-----
blank filter	T10-13356	CARB	Co	27	<0.03	-----	0.030	0.005	0.005	0.013	-----
blank filter	T10-13356	CARB	Ni	28	<0.03	-----	0.030	0.002	0.004	0.012	-----
blank filter	T10-13356	CARB	Cu	29	<0.04	-----	0.040	0.001	0.006	0.016	-----
blank filter	T10-13356	CARB	Zn	30	<0.02	-----	0.020	0.000	0.005	0.017	-----
blank filter	T10-13356	CARB	As	33	<0.02	-----	0.020	0.000	0.006	0.009	-----
blank filter	T10-13356	CARB	Se	34	<0.02	-----	0.020	0.000	0.006	0.013	-----
blank filter	T10-13356	CARB	Br	35	<0.02	-----	0.020	0.008	0.009	0.013	-----
blank filter	T10-13356	CARB	Rb	37	<0.02	-----	0.020	0.000	0.011	0.019	-----
blank filter	T10-13356	CARB	Sr	38	<0.03	-----	0.030	0.000	0.081	0.023	-----
blank filter	T10-13356	CARB	Zr	40	-----	-----	-----	0.000	0.085	0.032	-----
blank filter	T10-13356	CARB	Ag	47	-----	-----	-----	0.000	0.046	0.126	-----
blank filter	T10-13356	CARB	Cd	48	-----	-----	-----	0.000	0.048	0.166	-----
blank filter	T10-13356	CARB	In	49	-----	-----	-----	0.000	0.069	0.154	-----
blank filter	T10-13356	CARB	Sn	50	<0.20	-----	0.200	0.057	0.362	0.196	-----
blank filter	T10-13356	CARB	Sb	51	<0.20	-----	0.200	0.000	0.100	0.377	-----
blank filter	T10-13356	CARB	Cs	55	-----	-----	-----	0.000	0.039	0.110	-----
blank filter	T10-13356	CARB	Ba	56	<0.20	-----	0.200	0.000	0.032	0.105	-----
blank filter	T10-13356	CARB	Ce	58	-----	-----	-----	0.000	0.026	0.094	-----
blank filter	T10-13356	CARB	Pb	82	<0.03	-----	0.030	0.000	0.013	0.025	-----
blank filter	T10-13357	CARB	Na	11	-----	-----	-----	0.000	0.095	0.303	-----
blank filter	T10-13357	CARB	Mg	12	-----	-----	-----	0.000	0.032	0.114	-----
blank filter	T10-13357	CARB	Al	13	<0.20	-----	0.200	0.000	0.085	0.129	-----
blank filter	T10-13357	CARB	Si	14	<0.06	-----	0.060	0.016	0.036	0.093	-----
blank filter	T10-13357	CARB	P	15	<0.04	-----	0.040	0.000	0.031	0.155	-----
blank filter	T10-13357	CARB	S	16	<0.05	-----	0.050	0.000	0.021	0.095	-----
blank filter	T10-13357	CARB	Cl	17	<0.06	-----	0.060	0.000	0.019	0.075	-----
blank filter	T10-13357	CARB	K	19	<0.07	-----	0.070	0.005	0.014	0.070	-----
blank filter	T10-13357	CARB	Ca	20	<0.06	-----	0.060	0.000	0.016	0.073	-----
blank filter	T10-13357	CARB	Ti	22	<0.04	-----	0.040	0.000	0.013	0.051	-----

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
blank filter	T10-13357	CARB	V	23	<0.03	-----	0.030	0.000	0.011	0.037	-----
blank filter	T10-13357	CARB	Cr	24	<0.03	-----	0.030	0.000	0.008	0.025	-----
blank filter	T10-13357	CARB	Mn	25	<0.03	-----	0.030	0.000	0.006	0.018	-----
blank filter	T10-13357	CARB	Fe	26	<0.04	-----	0.040	0.000	0.005	0.016	-----
blank filter	T10-13357	CARB	Co	27	<0.03	-----	0.030	0.000	0.004	0.013	-----
blank filter	T10-13357	CARB	Ni	28	<0.03	-----	0.030	0.000	0.003	0.012	-----
blank filter	T10-13357	CARB	Cu	29	<0.04	-----	0.040	0.000	0.004	0.016	-----
blank filter	T10-13357	CARB	Zn	30	<0.02	-----	0.020	0.000	0.004	0.017	-----
blank filter	T10-13357	CARB	As	33	<0.02	-----	0.020	0.000	0.006	0.009	-----
blank filter	T10-13357	CARB	Se	34	<0.02	-----	0.020	0.000	0.006	0.013	-----
blank filter	T10-13357	CARB	Br	35	<0.02	-----	0.020	0.000	0.005	0.013	-----
blank filter	T10-13357	CARB	Rb	37	<0.02	-----	0.020	0.000	0.004	0.019	-----
blank filter	T10-13357	CARB	Sr	38	<0.03	-----	0.030	0.000	0.081	0.023	-----
blank filter	T10-13357	CARB	Zr	40	-----	-----	-----	0.000	0.085	0.032	-----
blank filter	T10-13357	CARB	Ag	47	-----	-----	-----	0.000	0.046	0.126	-----
blank filter	T10-13357	CARB	Cd	48	-----	-----	-----	0.000	0.048	0.166	-----
blank filter	T10-13357	CARB	In	49	-----	-----	-----	0.000	0.069	0.154	-----
blank filter	T10-13357	CARB	Sn	50	<0.20	-----	0.200	0.032	0.362	0.196	-----
blank filter	T10-13357	CARB	Sb	51	<0.20	-----	0.200	0.090	0.486	0.377	-----
blank filter	T10-13357	CARB	Cs	55	-----	-----	-----	0.000	0.039	0.110	-----
blank filter	T10-13357	CARB	Ba	56	<0.20	-----	0.200	0.000	0.032	0.105	-----
blank filter	T10-13357	CARB	Ce	58	-----	-----	-----	0.000	0.026	0.094	-----
blank filter	T10-13357	CARB	Pb	82	<0.03	-----	0.030	0.000	0.013	0.025	-----
blank filter	T10-13358	DRI	Na	11	0.000	1.721	0.734	0.000	0.100	0.303	-----
blank filter	T10-13358	DRI	Mg	12	0.000	0.522	0.503	0.000	0.032	0.114	-----
blank filter	T10-13358	DRI	Al	13	0.000	0.102	0.151	0.000	0.085	0.129	-----
blank filter	T10-13358	DRI	Si	14	0.058	0.061	0.077	0.000	0.042	0.093	-----
blank filter	T10-13358	DRI	P	15	0.001	0.017	0.013	0.000	0.031	0.155	-----
blank filter	T10-13358	DRI	S	16	0.000	0.017	0.012	0.000	0.021	0.095	-----
blank filter	T10-13358	DRI	Cl	17	0.000	0.017	0.032	0.000	0.019	0.075	-----
blank filter	T10-13358	DRI	K	19	0.000	0.023	0.018	0.000	0.017	0.070	-----
blank filter	T10-13358	DRI	Ca	20	0.000	0.069	0.032	0.000	0.016	0.073	-----
blank filter	T10-13358	DRI	Ti	22	0.000	0.025	0.026	0.000	0.013	0.051	-----
blank filter	T10-13358	DRI	V	23	0.000	0.017	0.004	0.000	0.011	0.037	-----
blank filter	T10-13358	DRI	Cr	24	0.002	0.017	0.006	0.002	0.008	0.025	-----
blank filter	T10-13358	DRI	Mn	25	0.000	0.051	0.015	0.000	0.006	0.018	-----
blank filter	T10-13358	DRI	Fe	26	0.000	0.017	0.021	0.000	0.005	0.016	-----
blank filter	T10-13358	DRI	Co	27	0.000	0.017	0.004	0.005	0.005	0.013	-----
blank filter	T10-13358	DRI	Ni	28	0.000	0.048	0.005	0.000	0.003	0.012	-----
blank filter	T10-13358	DRI	Cu	29	0.000	0.060	0.015	0.000	0.004	0.016	-----
blank filter	T10-13358	DRI	Zn	30	0.007	0.017	0.013	0.000	0.004	0.017	-----
blank filter	T10-13358	DRI	As	33	0.000	0.017	0.006	0.002	0.012	0.009	-----
blank filter	T10-13358	DRI	Se	34	0.000	0.017	0.040	0.000	0.006	0.013	-----
blank filter	T10-13358	DRI	Br	35	0.028	0.017	0.011	0.000	0.005	0.013	-----

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
blank filter	T10-13358	DRI	Rb	37	0.012	0.017	0.006	0.000	0.004	0.019	-----
blank filter	T10-13358	DRI	Sr	38	0.014	0.017	0.006	0.000	0.081	0.023	-----
blank filter	T10-13358	DRI	Zr	40	0.018	0.028	0.023	0.000	0.085	0.032	-----
blank filter	T10-13358	DRI	Ag	47	0.027	0.038	0.040	0.000	0.046	0.126	-----
blank filter	T10-13358	DRI	Cd	48	0.000	0.048	0.057	0.000	0.048	0.166	-----
blank filter	T10-13358	DRI	In	49	0.000	0.052	0.047	0.000	0.050	0.154	-----
blank filter	T10-13358	DRI	Sn	50	0.000	0.051	0.062	0.000	0.086	0.196	-----
blank filter	T10-13358	DRI	Sb	51	0.000	0.081	0.071	0.018	0.475	0.377	-----
blank filter	T10-13358	DRI	Cs	55	0.000	0.166	0.012	0.000	0.039	0.110	-----
blank filter	T10-13358	DRI	Ba	56	0.151	0.193	0.136	0.000	0.032	0.105	-----
blank filter	T10-13358	DRI	Ce	58	0.000	0.231	0.138	0.000	0.026	0.094	-----
blank filter	T10-13358	DRI	Pb	82	0.000	0.018	0.021	0.000	0.013	0.025	-----
blank filter	T10-13359	DRI	Na	11	0.000	1.652	0.734	0.000	0.100	0.303	-----
blank filter	T10-13359	DRI	Mg	12	0.000	0.524	0.503	0.000	0.032	0.114	-----
blank filter	T10-13359	DRI	Al	13	0.027	0.104	0.151	0.000	0.085	0.129	-----
blank filter	T10-13359	DRI	Si	14	0.039	0.061	0.077	0.014	0.037	0.093	-----
blank filter	T10-13359	DRI	P	15	0.000	0.017	0.013	0.000	0.031	0.155	-----
blank filter	T10-13359	DRI	S	16	0.000	0.017	0.012	0.000	0.021	0.095	-----
blank filter	T10-13359	DRI	Cl	17	0.000	0.017	0.032	0.000	0.019	0.075	-----
blank filter	T10-13359	DRI	K	19	0.000	0.023	0.018	0.000	0.018	0.070	-----
blank filter	T10-13359	DRI	Ca	20	0.000	0.069	0.032	0.000	0.017	0.073	-----
blank filter	T10-13359	DRI	Ti	22	0.000	0.025	0.026	0.001	0.020	0.051	-----
blank filter	T10-13359	DRI	V	23	0.001	0.017	0.004	0.000	0.011	0.037	-----
blank filter	T10-13359	DRI	Cr	24	0.000	0.017	0.006	0.000	0.008	0.025	-----
blank filter	T10-13359	DRI	Mn	25	0.000	0.051	0.015	0.000	0.006	0.018	-----
blank filter	T10-13359	DRI	Fe	26	0.054	0.017	0.021	0.000	0.005	0.016	-----
blank filter	T10-13359	DRI	Co	27	0.000	0.017	0.004	0.000	0.004	0.013	-----
blank filter	T10-13359	DRI	Ni	28	0.007	0.048	0.005	0.000	0.003	0.012	-----
blank filter	T10-13359	DRI	Cu	29	0.000	0.060	0.015	0.000	0.004	0.016	-----
blank filter	T10-13359	DRI	Zn	30	0.000	0.017	0.013	0.000	0.005	0.017	-----
blank filter	T10-13359	DRI	As	33	0.000	0.017	0.006	0.006	0.008	0.009	-----
blank filter	T10-13359	DRI	Se	34	0.000	0.017	0.040	0.000	0.006	0.013	-----
blank filter	T10-13359	DRI	Br	35	0.000	0.017	0.011	0.000	0.005	0.013	-----
blank filter	T10-13359	DRI	Rb	37	0.000	0.017	0.006	0.004	0.011	0.019	-----
blank filter	T10-13359	DRI	Sr	38	0.009	0.017	0.006	0.053	0.103	0.023	-----
blank filter	T10-13359	DRI	Zr	40	0.000	0.027	0.023	0.000	0.085	0.032	-----
blank filter	T10-13359	DRI	Ag	47	0.000	0.038	0.040	0.000	0.046	0.126	-----
blank filter	T10-13359	DRI	Cd	48	0.047	0.049	0.057	0.000	0.048	0.166	-----
blank filter	T10-13359	DRI	In	49	0.000	0.052	0.047	0.000	0.050	0.154	-----
blank filter	T10-13359	DRI	Sn	50	0.000	0.051	0.062	0.226	0.373	0.196	-----
blank filter	T10-13359	DRI	Sb	51	0.000	0.081	0.071	0.000	0.100	0.377	-----
blank filter	T10-13359	DRI	Cs	55	0.000	0.166	0.012	0.000	0.039	0.110	-----
blank filter	T10-13359	DRI	Ba	56	0.000	0.196	0.136	0.000	0.032	0.105	-----
blank filter	T10-13359	DRI	Ce	58	0.000	0.231	0.138	0.000	0.026	0.094	-----

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
blank filter	T10-13359	DRI	Pb	82	0.009	0.018	0.021	0.000	0.013	0.025	-----
blank filter	T10-13360	ODEQ	Na	11	-----	-----	-----	0.000	0.095	0.303	-----
blank filter	T10-13360	ODEQ	Mg	12	-----	-----	-----	0.000	0.032	0.114	-----
blank filter	T10-13360	ODEQ	Al	13	<0.17	0.056	0.170	0.000	0.085	0.129	-----
blank filter	T10-13360	ODEQ	Si	14	<0.11	0.036	0.110	0.001	0.034	0.093	-----
blank filter	T10-13360	ODEQ	P	15	<0.051	0.017	0.051	0.000	0.031	0.155	-----
blank filter	T10-13360	ODEQ	S	16	<0.16	0.052	0.160	0.000	0.021	0.095	-----
blank filter	T10-13360	ODEQ	Cl	17	<0.13	0.043	0.130	0.000	0.015	0.075	-----
blank filter	T10-13360	ODEQ	K	19	<0.052	0.018	0.052	0.000	0.015	0.070	-----
blank filter	T10-13360	ODEQ	Ca	20	<0.11	0.037	0.110	0.000	0.015	0.073	-----
blank filter	T10-13360	ODEQ	Ti	22	<0.14	0.047	0.140	0.000	0.013	0.051	-----
blank filter	T10-13360	ODEQ	V	23	<0.049	0.016	0.049	0.000	0.011	0.037	-----
blank filter	T10-13360	ODEQ	Cr	24	<0.036	0.012	0.036	0.000	0.008	0.025	-----
blank filter	T10-13360	ODEQ	Mn	25	<0.042	0.014	0.042	0.000	0.006	0.018	-----
blank filter	T10-13360	ODEQ	Fe	26	<0.034	0.011	0.034	0.000	0.005	0.016	-----
blank filter	T10-13360	ODEQ	Co	27	<0.025	0.009	0.025	0.000	0.004	0.013	-----
blank filter	T10-13360	ODEQ	Ni	28	<0.022	0.007	0.022	0.002	0.004	0.012	-----
blank filter	T10-13360	ODEQ	Cu	29	<0.032	0.011	0.032	0.000	0.004	0.016	-----
blank filter	T10-13360	ODEQ	Zn	30	<0.022	0.007	0.022	0.000	0.004	0.017	-----
blank filter	T10-13360	ODEQ	As	33	<0.027	0.009	0.027	0.007	0.012	0.009	-----
blank filter	T10-13360	ODEQ	Se	34	<0.028	0.009	0.028	0.002	0.008	0.013	-----
blank filter	T10-13360	ODEQ	Br	35	<0.025	0.008	0.025	0.000	0.005	0.013	-----
blank filter	T10-13360	ODEQ	Rb	37	<0.024	0.008	0.024	0.000	0.004	0.019	-----
blank filter	T10-13360	ODEQ	Sr	38	<0.021	0.007	0.021	0.000	0.081	0.023	-----
blank filter	T10-13360	ODEQ	Zr	40	<0.028	0.009	0.028	0.000	0.085	0.032	-----
blank filter	T10-13360	ODEQ	Ag	47	<0.088	0.029	0.088	0.000	0.046	0.126	-----
blank filter	T10-13360	ODEQ	Cd	48	<0.097	0.032	0.097	0.000	0.048	0.166	-----
blank filter	T10-13360	ODEQ	In	49	<0.098	0.033	0.098	0.000	0.050	0.154	-----
blank filter	T10-13360	ODEQ	Sn	50	<0.14	0.047	0.140	0.000	0.086	0.196	-----
blank filter	T10-13360	ODEQ	Sb	51	<0.12	0.039	0.120	0.000	0.100	0.377	-----
blank filter	T10-13360	ODEQ	Cs	55	<0.24	0.079	0.240	0.000	0.039	0.110	-----
blank filter	T10-13360	ODEQ	Ba	56	<0.31	0.103	0.310	0.000	0.032	0.105	-----
blank filter	T10-13360	ODEQ	Ce	58	<0.51	0.170	0.510	0.000	0.026	0.094	-----
blank filter	T10-13360	ODEQ	Pb	82	<0.055	0.018	0.055	0.000	0.013	0.025	-----
blank filter	T10-13361	ODEQ	Na	11	-----	-----	-----	0.000	0.095	0.303	-----
blank filter	T10-13361	ODEQ	Mg	12	-----	-----	-----	0.000	0.032	0.114	-----
blank filter	T10-13361	ODEQ	Al	13	<0.17	0.056	0.170	0.000	0.085	0.129	-----
blank filter	T10-13361	ODEQ	Si	14	<0.11	0.036	0.110	0.000	0.042	0.093	-----
blank filter	T10-13361	ODEQ	P	15	<0.051	0.017	0.051	0.000	0.031	0.155	-----
blank filter	T10-13361	ODEQ	S	16	<0.16	0.052	0.160	0.007	0.019	0.095	-----
blank filter	T10-13361	ODEQ	Cl	17	<0.13	0.043	0.130	0.016	0.015	0.075	-----
blank filter	T10-13361	ODEQ	K	19	<0.055	0.018	0.055	0.000	0.017	0.070	-----
blank filter	T10-13361	ODEQ	Ca	20	<0.11	0.037	0.110	0.000	0.016	0.073	-----
blank filter	T10-13361	ODEQ	Ti	22	<0.15	0.048	0.150	0.000	0.013	0.051	-----

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
blank filter	T10-13361	ODEQ	V	23	<0.050	0.017	0.050	0.000	0.011	0.037	-----
blank filter	T10-13361	ODEQ	Cr	24	<0.036	0.012	0.036	0.004	0.008	0.025	-----
blank filter	T10-13361	ODEQ	Mn	25	<0.040	0.013	0.040	0.000	0.006	0.018	-----
blank filter	T10-13361	ODEQ	Fe	26	<0.034	0.011	0.034	0.014	0.006	0.016	-----
blank filter	T10-13361	ODEQ	Co	27	<0.026	0.009	0.026	0.006	0.005	0.013	-----
blank filter	T10-13361	ODEQ	Ni	28	<0.022	0.007	0.022	0.000	0.003	0.012	-----
blank filter	T10-13361	ODEQ	Cu	29	<0.033	0.011	0.033	0.000	0.004	0.016	-----
blank filter	T10-13361	ODEQ	Zn	30	<0.022	0.007	0.022	0.000	0.004	0.017	-----
blank filter	T10-13361	ODEQ	As	33	<0.028	0.009	0.028	0.000	0.006	0.009	-----
blank filter	T10-13361	ODEQ	Se	34	<0.029	0.010	0.029	0.000	0.006	0.013	-----
blank filter	T10-13361	ODEQ	Br	35	<0.025	0.008	0.025	0.017	0.009	0.013	-----
blank filter	T10-13361	ODEQ	Rb	37	<0.024	0.008	0.024	0.000	0.004	0.019	-----
blank filter	T10-13361	ODEQ	Sr	38	<0.022	0.007	0.022	0.000	0.081	0.023	-----
blank filter	T10-13361	ODEQ	Zr	40	<0.029	0.010	0.029	0.000	0.085	0.032	-----
blank filter	T10-13361	ODEQ	Ag	47	<0.089	0.030	0.089	0.068	0.147	0.126	-----
blank filter	T10-13361	ODEQ	Cd	48	<0.098	0.033	0.098	0.113	0.192	0.166	-----
blank filter	T10-13361	ODEQ	In	49	<0.099	0.033	0.099	0.000	0.050	0.154	-----
blank filter	T10-13361	ODEQ	Sn	50	<0.14	0.048	0.140	0.034	0.350	0.196	-----
blank filter	T10-13361	ODEQ	Sb	51	<0.12	0.039	0.120	0.011	0.463	0.377	-----
blank filter	T10-13361	ODEQ	Cs	55	<0.24	0.081	0.240	0.000	0.039	0.110	-----
blank filter	T10-13361	ODEQ	Ba	56	<0.32	0.105	0.320	0.000	0.032	0.105	-----
blank filter	T10-13361	ODEQ	Ce	58	<0.52	0.173	0.520	0.000	0.026	0.094	-----
blank filter	T10-13361	ODEQ	Pb	82	<0.057	0.019	0.057	0.000	0.013	0.025	-----
blank filter	T10-13362	AQMD	Na	11	-----	-----	-----	0.000	0.095	0.303	-----
blank filter	T10-13362	AQMD	Mg	12	ND	-----	0.295	0.000	0.032	0.114	-----
blank filter	T10-13362	AQMD	Al	13	ND	-----	0.555	0.000	0.085	0.129	-----
blank filter	T10-13362	AQMD	Si	14	ND	-----	0.165	0.000	0.042	0.093	-----
blank filter	T10-13362	AQMD	P	15	ND	-----	0.035	0.000	0.031	0.155	-----
blank filter	T10-13362	AQMD	S	16	ND	-----	0.106	0.000	0.021	0.095	-----
blank filter	T10-13362	AQMD	Cl	17	ND	-----	0.059	0.000	0.019	0.075	-----
blank filter	T10-13362	AQMD	K	19	ND	-----	0.059	0.000	0.017	0.070	-----
blank filter	T10-13362	AQMD	Ca	20	ND	-----	0.094	0.000	0.016	0.073	-----
blank filter	T10-13362	AQMD	Ti	22	ND	-----	0.094	0.000	0.013	0.051	-----
blank filter	T10-13362	AQMD	V	23	ND	-----	0.094	0.000	0.011	0.037	-----
blank filter	T10-13362	AQMD	Cr	24	ND	-----	0.071	0.000	0.008	0.025	-----
blank filter	T10-13362	AQMD	Mn	25	0.110	0.010	0.094	0.002	0.008	0.018	-----
blank filter	T10-13362	AQMD	Fe	26	ND	-----	0.071	0.000	0.006	0.016	-----
blank filter	T10-13362	AQMD	Co	27	-----	-----	-----	0.000	0.004	0.013	-----
blank filter	T10-13362	AQMD	Ni	28	ND	-----	0.059	0.000	0.003	0.012	-----
blank filter	T10-13362	AQMD	Cu	29	ND	-----	0.059	0.000	0.004	0.016	-----
blank filter	T10-13362	AQMD	Zn	30	ND	-----	0.035	0.000	0.006	0.017	-----
blank filter	T10-13362	AQMD	As	33	ND	-----	0.083	0.003	0.012	0.009	-----
blank filter	T10-13362	AQMD	Se	34	ND	-----	0.177	0.000	0.006	0.013	-----
blank filter	T10-13362	AQMD	Br	35	ND	-----	0.094	0.000	0.005	0.013	-----

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
blank filter	T10-13362	AQMD	Rb	37	ND	-----	0.083	0.000	0.004	0.019	-----
blank filter	T10-13362	AQMD	Sr	38	ND	-----	0.083	0.000	0.081	0.023	-----
blank filter	T10-13362	AQMD	Zr	40	ND	-----	0.083	0.000	0.085	0.032	-----
blank filter	T10-13362	AQMD	Ag	47	ND	-----	0.212	0.000	0.046	0.126	-----
blank filter	T10-13362	AQMD	Cd	48	ND	-----	0.201	0.000	0.048	0.166	-----
blank filter	T10-13362	AQMD	In	49	ND	-----	0.236	0.000	0.050	0.154	-----
blank filter	T10-13362	AQMD	Sn	50	ND	-----	0.319	0.000	0.086	0.196	-----
blank filter	T10-13362	AQMD	Sb	51	ND	-----	0.307	0.000	0.100	0.377	-----
blank filter	T10-13362	AQMD	Cs	55	ND	-----	0.661	0.000	0.039	0.110	-----
blank filter	T10-13362	AQMD	Ba	56	ND	-----	0.791	0.000	0.032	0.105	-----
blank filter	T10-13362	AQMD	Ce	58	-----	-----	-----	0.000	0.026	0.094	-----
blank filter	T10-13362	AQMD	Pb	82	ND	-----	0.295	0.000	0.013	0.025	-----
blank filter	T10-13363	AQMD	Na	11	-----	-----	-----	0.000	0.095	0.303	-----
blank filter	T10-13363	AQMD	Mg	12	ND	-----	0.295	0.000	0.030	0.114	-----
blank filter	T10-13363	AQMD	Al	13	ND	-----	0.555	0.000	0.085	0.129	-----
blank filter	T10-13363	AQMD	Si	14	ND	-----	0.165	0.000	0.042	0.093	-----
blank filter	T10-13363	AQMD	P	15	ND	-----	0.035	0.000	0.031	0.155	-----
blank filter	T10-13363	AQMD	S	16	ND	-----	0.106	0.000	0.021	0.095	-----
blank filter	T10-13363	AQMD	Cl	17	ND	-----	0.059	0.000	0.015	0.075	-----
blank filter	T10-13363	AQMD	K	19	ND	-----	0.059	0.001	0.014	0.070	-----
blank filter	T10-13363	AQMD	Ca	20	ND	-----	0.094	0.002	0.015	0.073	-----
blank filter	T10-13363	AQMD	Ti	22	ND	-----	0.094	0.000	0.013	0.051	-----
blank filter	T10-13363	AQMD	V	23	ND	-----	0.094	0.000	0.011	0.037	-----
blank filter	T10-13363	AQMD	Cr	24	ND	-----	0.071	0.000	0.008	0.025	-----
blank filter	T10-13363	AQMD	Mn	25	ND	-----	0.094	0.000	0.006	0.018	-----
blank filter	T10-13363	AQMD	Fe	26	ND	-----	0.071	0.000	0.005	0.016	-----
blank filter	T10-13363	AQMD	Co	27	-----	-----	-----	0.000	0.004	0.013	-----
blank filter	T10-13363	AQMD	Ni	28	ND	-----	0.059	0.000	0.003	0.012	-----
blank filter	T10-13363	AQMD	Cu	29	ND	-----	0.059	0.000	0.004	0.016	-----
blank filter	T10-13363	AQMD	Zn	30	ND	-----	0.035	0.000	0.004	0.017	-----
blank filter	T10-13363	AQMD	As	33	ND	-----	0.083	0.000	0.006	0.009	-----
blank filter	T10-13363	AQMD	Se	34	ND	-----	0.177	0.000	0.006	0.013	-----
blank filter	T10-13363	AQMD	Br	35	ND	-----	0.094	0.001	0.008	0.013	-----
blank filter	T10-13363	AQMD	Rb	37	ND	-----	0.083	0.000	0.004	0.019	-----
blank filter	T10-13363	AQMD	Sr	38	ND	-----	0.083	0.000	0.081	0.023	-----
blank filter	T10-13363	AQMD	Zr	40	ND	-----	0.083	0.000	0.085	0.032	-----
blank filter	T10-13363	AQMD	Ag	47	ND	-----	0.212	0.000	0.046	0.126	-----
blank filter	T10-13363	AQMD	Cd	48	ND	-----	0.201	0.000	0.048	0.166	-----
blank filter	T10-13363	AQMD	In	49	ND	-----	0.236	0.000	0.050	0.154	-----
blank filter	T10-13363	AQMD	Sn	50	ND	-----	0.319	0.000	0.086	0.196	-----
blank filter	T10-13363	AQMD	Sb	51	ND	-----	0.307	0.000	0.100	0.377	-----
blank filter	T10-13363	AQMD	Cs	55	ND	-----	0.661	0.000	0.039	0.110	-----
blank filter	T10-13363	AQMD	Ba	56	ND	-----	0.791	0.000	0.032	0.105	-----
blank filter	T10-13363	AQMD	Ce	58	-----	-----	-----	0.000	0.026	0.094	-----

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
blank filter	T10-13363	AQMD	Pb	82	ND	-----	0.295	0.000	0.013	0.025	-----
blank filter	T10-13364	UCD	Na	11	0.000	0.000	1.162	0.052	0.069	0.303	-----
blank filter	T10-13364	UCD	Mg	12	0.000	0.000	0.373	0.000	0.032	0.114	-----
blank filter	T10-13364	UCD	Al	13	0.000	0.000	0.189	0.000	0.085	0.129	-----
blank filter	T10-13364	UCD	Si	14	0.195	0.060	0.102	0.000	0.042	0.093	-----
blank filter	T10-13364	UCD	P	15	0.312	0.064	0.062	0.000	0.031	0.155	-----
blank filter	T10-13364	UCD	S	16	0.000	0.000	0.041	0.000	0.021	0.095	-----
blank filter	T10-13364	UCD	Cl	17	0.000	0.000	0.030	0.000	0.019	0.075	-----
blank filter	T10-13364	UCD	K	19	0.000	0.000	0.019	0.000	0.017	0.070	-----
blank filter	T10-13364	UCD	Ca	20	0.000	0.000	0.009	0.000	0.016	0.073	-----
blank filter	T10-13364	UCD	Ti	22	0.013	0.004	0.005	0.000	0.013	0.051	-----
blank filter	T10-13364	UCD	V	23	0.009	0.002	0.004	0.000	0.011	0.037	-----
blank filter	T10-13364	UCD	Cr	24	0.013	0.007	0.003	0.000	0.008	0.025	-----
blank filter	T10-13364	UCD	Mn	25	0.006	0.002	0.004	0.000	0.006	0.018	-----
blank filter	T10-13364	UCD	Fe	26	0.010	0.003	0.007	0.000	0.005	0.016	-----
blank filter	T10-13364	UCD	Co	27	-----	-----	-----	0.003	0.004	0.013	-----
blank filter	T10-13364	UCD	Ni	28	0.000	0.000	0.005	0.000	0.003	0.012	-----
blank filter	T10-13364	UCD	Cu	29	0.000	0.000	0.005	0.002	0.005	0.016	-----
blank filter	T10-13364	UCD	Zn	30	0.000	0.000	0.004	0.000	0.004	0.017	-----
blank filter	T10-13364	UCD	As	33	0.000	0.000	0.004	0.009	0.008	0.009	-----
blank filter	T10-13364	UCD	Se	34	0.011	0.004	0.004	0.003	0.008	0.013	-----
blank filter	T10-13364	UCD	Br	35	0.000	0.000	0.004	0.000	0.009	0.013	-----
blank filter	T10-13364	UCD	Rb	37	0.000	0.000	0.008	0.000	0.004	0.019	-----
blank filter	T10-13364	UCD	Sr	38	0.000	0.000	0.011	0.000	0.081	0.023	-----
blank filter	T10-13364	UCD	Zr	40	0.000	0.000	0.020	0.000	0.085	0.032	-----
blank filter	T10-13364	UCD	Ag	47	-----	-----	-----	0.000	0.046	0.126	-----
blank filter	T10-13364	UCD	Cd	48	-----	-----	-----	0.068	0.181	0.166	-----
blank filter	T10-13364	UCD	In	49	-----	-----	-----	0.000	0.069	0.154	-----
blank filter	T10-13364	UCD	Sn	50	-----	-----	-----	0.000	0.086	0.196	-----
blank filter	T10-13364	UCD	Sb	51	-----	-----	-----	0.000	0.100	0.377	-----
blank filter	T10-13364	UCD	Cs	55	-----	-----	-----	0.000	0.039	0.110	-----
blank filter	T10-13364	UCD	Ba	56	-----	-----	-----	0.000	0.032	0.105	-----
blank filter	T10-13364	UCD	Ce	58	-----	-----	-----	0.000	0.026	0.094	-----
blank filter	T10-13364	UCD	Pb	82	0.018	0.006	0.007	0.000	0.013	0.025	-----
blank filter	T10-13365	UCD	Na	11	1.900	0.457	1.134	0.000	0.095	0.303	-----
blank filter	T10-13365	UCD	Mg	12	0.000	0.000	0.364	0.000	0.032	0.114	-----
blank filter	T10-13365	UCD	Al	13	0.429	0.100	0.182	0.000	0.085	0.129	-----
blank filter	T10-13365	UCD	Si	14	0.291	0.064	0.098	0.000	0.042	0.093	-----
blank filter	T10-13365	UCD	P	15	0.000	0.000	0.060	0.000	0.031	0.155	-----
blank filter	T10-13365	UCD	S	16	0.176	0.038	0.040	0.000	0.021	0.095	-----
blank filter	T10-13365	UCD	Cl	17	0.000	0.000	0.028	0.000	0.015	0.075	-----
blank filter	T10-13365	UCD	K	19	0.036	0.009	0.019	0.000	0.015	0.070	-----
blank filter	T10-13365	UCD	Ca	20	0.000	0.000	0.008	0.000	0.015	0.073	-----
blank filter	T10-13365	UCD	Ti	22	0.007	0.002	0.005	0.000	0.013	0.051	-----

Table 13. XRF PT Results (47-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			RTI (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
blank filter	T10-13365	UCD	V	23	0.006	0.002	0.003	0.000	0.011	0.037	-----
blank filter	T10-13365	UCD	Cr	24	0.004	0.002	0.003	0.000	0.008	0.025	-----
blank filter	T10-13365	UCD	Mn	25	0.005	0.002	0.004	0.000	0.006	0.018	-----
blank filter	T10-13365	UCD	Fe	26	0.000	0.000	0.007	0.000	0.005	0.016	-----
blank filter	T10-13365	UCD	Co	27	-----	-----	-----	0.002	0.004	0.013	-----
blank filter	T10-13365	UCD	Ni	28	0.000	0.000	0.005	0.000	0.003	0.012	-----
blank filter	T10-13365	UCD	Cu	29	0.000	0.000	0.005	0.000	0.004	0.016	-----
blank filter	T10-13365	UCD	Zn	30	0.000	0.000	0.004	0.000	0.004	0.017	-----
blank filter	T10-13365	UCD	As	33	0.000	0.000	0.004	0.002	0.007	0.009	-----
blank filter	T10-13365	UCD	Se	34	0.000	0.000	0.004	0.006	0.007	0.013	-----
blank filter	T10-13365	UCD	Br	35	0.004	0.002	0.004	0.000	0.005	0.013	-----
blank filter	T10-13365	UCD	Rb	37	0.000	0.000	0.008	0.000	0.004	0.019	-----
blank filter	T10-13365	UCD	Sr	38	0.000	0.000	0.010	0.000	0.081	0.023	-----
blank filter	T10-13365	UCD	Zr	40	0.000	0.000	0.019	0.000	0.085	0.032	-----
blank filter	T10-13365	UCD	Ag	47	-----	-----	-----	0.000	0.046	0.126	-----
blank filter	T10-13365	UCD	Cd	48	-----	-----	-----	0.011	0.181	0.166	-----
blank filter	T10-13365	UCD	In	49	-----	-----	-----	0.000	0.050	0.154	-----
blank filter	T10-13365	UCD	Sn	50	-----	-----	-----	0.000	0.086	0.196	-----
blank filter	T10-13365	UCD	Sb	51	-----	-----	-----	0.000	0.100	0.377	-----
blank filter	T10-13365	UCD	Cs	55	-----	-----	-----	0.000	0.039	0.110	-----
blank filter	T10-13365	UCD	Ba	56	-----	-----	-----	0.000	0.032	0.105	-----
blank filter	T10-13365	UCD	Ce	58	-----	-----	-----	0.000	0.026	0.094	-----
blank filter	T10-13365	UCD	Pb	82	0.023	0.008	0.007	0.000	0.013	0.025	-----

**** Median was calculated only when the result from all reporting labs was greater than three times the uncertainty.***

Table 14. XRF PT Results (25-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			UCD (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
126-hr event	T10-13320	DRI	Na	11	9.098	0.712	0.219	11.808	1.012	0.766	-----
126-hr event	T10-13320	DRI	Mg	12	0.000	0.148	0.151	0.468	0.110	0.250	-----
126-hr event	T10-13320	DRI	Al	13	0.913	0.032	0.045	1.673	0.128	0.123	-----
126-hr event	T10-13320	DRI	Si	14	4.322	0.035	0.023	7.522	0.392	0.067	4.420
126-hr event	T10-13320	DRI	P	15	0.000	0.005	0.004	0.000	0.000	0.041	-----
126-hr event	T10-13320	DRI	S	16	37.776	0.136	0.004	34.967	1.754	0.025	34.403
126-hr event	T10-13320	DRI	Cl	17	0.151	0.005	0.009	0.000	0.000	0.015	-----
126-hr event	T10-13320	DRI	K	19	3.146	0.011	0.005	3.223	0.163	0.008	3.333
126-hr event	T10-13320	DRI	Ca	20	1.846	0.024	0.009	2.103	0.107	0.004	1.743
126-hr event	T10-13320	DRI	Ti	22	0.123	0.008	0.008	0.127	0.007	0.002	-----
126-hr event	T10-13320	DRI	V	23	0.015	0.005	0.001	0.023	0.003	0.002	-----
126-hr event	T10-13320	DRI	Cr	24	0.012	0.005	0.002	0.008	0.001	0.001	-----
126-hr event	T10-13320	DRI	Mn	25	0.132	0.016	0.005	0.119	0.006	0.001	-----
126-hr event	T10-13320	DRI	Fe	26	2.501	0.010	0.006	2.464	0.124	0.002	2.320
126-hr event	T10-13320	DRI	Ni	28	0.000	0.014	0.001	0.003	0.001	0.002	-----
126-hr event	T10-13320	DRI	Cu	29	0.091	0.018	0.005	0.108	0.006	0.002	-----
126-hr event	T10-13320	DRI	Zn	30	0.716	0.007	0.004	0.710	0.036	0.002	0.650
126-hr event	T10-13320	DRI	As	33	0.000	0.005	0.002	0.032	0.004	0.007	-----
126-hr event	T10-13320	DRI	Se	34	0.000	0.005	0.012	0.056	0.003	0.001	-----
126-hr event	T10-13320	DRI	Br	35	0.205	0.006	0.003	0.258	0.013	0.002	0.230
126-hr event	T10-13320	DRI	Rb	37	0.021	0.005	0.002	0.009	0.003	0.002	-----
126-hr event	T10-13320	DRI	Sr	38	0.016	0.005	0.002	0.016	0.002	0.003	-----
126-hr event	T10-13320	DRI	Zr	40	0.033	0.008	0.007	0.005	0.002	0.005	-----
126-hr event	T10-13320	DRI	Pb	82	0.168	0.006	0.006	0.143	0.010	0.003	-----
126-hr event	T10-13321	DRI	Na	11	10.483	0.758	0.219	11.101	1.002	0.751	-----
126-hr event	T10-13321	DRI	Mg	12	0.116	0.149	0.151	0.000	0.000	0.246	-----
126-hr event	T10-13321	DRI	Al	13	0.843	0.032	0.045	1.779	0.142	0.121	-----
126-hr event	T10-13321	DRI	Si	14	4.204	0.035	0.023	7.143	0.373	0.066	4.420
126-hr event	T10-13321	DRI	P	15	0.000	0.005	0.004	0.000	0.000	0.040	-----
126-hr event	T10-13321	DRI	S	16	37.280	0.134	0.004	34.203	1.715	0.024	34.403
126-hr event	T10-13321	DRI	Cl	17	0.146	0.005	0.009	0.000	0.000	0.015	-----
126-hr event	T10-13321	DRI	K	19	3.093	0.010	0.005	3.181	0.161	0.008	3.333
126-hr event	T10-13321	DRI	Ca	20	1.817	0.024	0.009	2.007	0.102	0.004	1.743
126-hr event	T10-13321	DRI	Ti	22	0.114	0.008	0.008	0.119	0.007	0.002	-----
126-hr event	T10-13321	DRI	V	23	0.017	0.005	0.001	0.022	0.003	0.001	-----
126-hr event	T10-13321	DRI	Cr	24	0.017	0.005	0.002	0.005	0.001	0.001	-----
126-hr event	T10-13321	DRI	Mn	25	0.143	0.016	0.005	0.121	0.007	0.001	-----
126-hr event	T10-13321	DRI	Fe	26	2.450	0.010	0.006	2.400	0.121	0.002	2.320
126-hr event	T10-13321	DRI	Ni	28	0.003	0.014	0.001	0.000	0.000	0.002	-----
126-hr event	T10-13321	DRI	Cu	29	0.107	0.018	0.005	0.103	0.006	0.002	-----
126-hr event	T10-13321	DRI	Zn	30	0.728	0.007	0.004	0.714	0.036	0.002	0.650
126-hr event	T10-13321	DRI	As	33	0.000	0.005	0.002	0.038	0.004	0.007	-----
126-hr event	T10-13321	DRI	Se	34	0.000	0.005	0.012	0.055	0.003	0.001	-----
126-hr event	T10-13321	DRI	Br	35	0.210	0.006	0.003	0.261	0.013	0.001	0.230

Table 14. XRF PT Results (25-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			UCD (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
126-hr event	T10-13321	DRI	Rb	37	0.012	0.005	0.002	0.008	0.003	0.002	-----
126-hr event	T10-13321	DRI	Sr	38	0.020	0.005	0.002	0.016	0.002	0.003	-----
126-hr event	T10-13321	DRI	Zr	40	0.010	0.008	0.007	0.008	0.003	0.005	-----
126-hr event	T10-13321	DRI	Pb	82	0.193	0.006	0.006	0.137	0.009	0.003	-----
126-hr event	T10-13322	RTI	Na	11	2.872	0.246	0.054	5.687	0.791	0.740	-----
126-hr event	T10-13322	RTI	Mg	12	0.311	0.032	0.016	0.000	0.000	0.243	-----
126-hr event	T10-13322	RTI	Al	13	0.962	0.090	0.058	1.693	0.139	0.120	-----
126-hr event	T10-13322	RTI	Si	14	5.218	0.347	0.032	7.269	0.379	0.065	4.420
126-hr event	T10-13322	RTI	P	15	0.170	0.026	0.016	0.000	0.000	0.040	-----
126-hr event	T10-13322	RTI	S	16	34.929	1.750	0.015	34.649	1.738	0.024	34.403
126-hr event	T10-13322	RTI	Cl	17	0.238	0.017	0.011	0.000	0.000	0.015	-----
126-hr event	T10-13322	RTI	K	19	3.497	0.176	0.007	3.169	0.160	0.008	3.333
126-hr event	T10-13322	RTI	Ca	20	1.776	0.089	0.005	2.065	0.105	0.004	1.743
126-hr event	T10-13322	RTI	Ti	22	0.059	0.010	0.015	0.121	0.007	0.002	-----
126-hr event	T10-13322	RTI	V	23	0.015	0.005	0.011	0.021	0.003	0.002	-----
126-hr event	T10-13322	RTI	Cr	24	0.010	0.003	0.008	0.012	0.001	0.001	-----
126-hr event	T10-13322	RTI	Mn	25	0.131	0.008	0.007	0.124	0.007	0.001	-----
126-hr event	T10-13322	RTI	Fe	26	2.448	0.123	0.008	2.425	0.122	0.002	2.320
126-hr event	T10-13322	RTI	Ni	28	0.009	0.002	0.004	0.003	0.001	0.002	-----
126-hr event	T10-13322	RTI	Cu	29	0.109	0.006	0.006	0.107	0.006	0.002	-----
126-hr event	T10-13322	RTI	Zn	30	0.791	0.040	0.005	0.725	0.037	0.002	0.650
126-hr event	T10-13322	RTI	As	33	0.027	0.007	0.007	0.037	0.004	0.007	-----
126-hr event	T10-13322	RTI	Se	34	0.068	0.006	0.009	0.060	0.003	0.001	-----
126-hr event	T10-13322	RTI	Br	35	0.225	0.014	0.008	0.266	0.014	0.001	0.230
126-hr event	T10-13322	RTI	Rb	37	0.002	0.005	0.007	0.015	0.004	0.002	-----
126-hr event	T10-13322	RTI	Sr	38	0.016	0.005	0.006	0.018	0.002	0.003	-----
126-hr event	T10-13322	RTI	Zr	40	0.000	0.023	0.071	0.000	0.000	0.005	-----
126-hr event	T10-13322	RTI	Pb	82	0.146	0.017	0.018	0.139	0.010	0.003	-----
126-hr event	T10-13323	RTI	Na	11	2.872	0.246	0.054	14.243	1.222	0.796	-----
126-hr event	T10-13323	RTI	Mg	12	0.316	0.032	0.016	0.000	0.000	0.260	-----
126-hr event	T10-13323	RTI	Al	13	0.913	0.087	0.058	1.894	0.153	0.127	-----
126-hr event	T10-13323	RTI	Si	14	5.162	0.344	0.032	7.270	0.380	0.069	4.420
126-hr event	T10-13323	RTI	P	15	0.147	0.026	0.016	0.000	0.000	0.042	-----
126-hr event	T10-13323	RTI	S	16	36.590	1.833	0.015	37.375	1.874	0.025	34.403
126-hr event	T10-13323	RTI	Cl	17	0.280	0.019	0.011	0.000	0.000	0.015	-----
126-hr event	T10-13323	RTI	K	19	3.705	0.186	0.007	3.405	0.172	0.008	3.333
126-hr event	T10-13323	RTI	Ca	20	1.774	0.089	0.005	2.055	0.104	0.004	1.743
126-hr event	T10-13323	RTI	Ti	22	0.076	0.011	0.015	0.122	0.007	0.002	-----
126-hr event	T10-13323	RTI	V	23	0.006	0.006	0.011	0.023	0.003	0.002	-----
126-hr event	T10-13323	RTI	Cr	24	0.020	0.004	0.008	0.009	0.001	0.001	-----
126-hr event	T10-13323	RTI	Mn	25	0.134	0.008	0.007	0.120	0.007	0.001	-----
126-hr event	T10-13323	RTI	Fe	26	2.507	0.126	0.008	2.442	0.123	0.002	2.320
126-hr event	T10-13323	RTI	Ni	28	0.004	0.002	0.004	0.000	0.000	0.002	-----
126-hr event	T10-13323	RTI	Cu	29	0.107	0.007	0.006	0.102	0.006	0.002	-----

Table 14. XRF PT Results (25-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			UCD (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
126-hr event	T10-13323	RTI	Zn	30	0.797	0.040	0.005	0.747	0.038	0.002	0.650
126-hr event	T10-13323	RTI	As	33	0.018	0.008	0.007	0.035	0.004	0.007	-----
126-hr event	T10-13323	RTI	Se	34	0.049	0.007	0.009	0.059	0.003	0.001	-----
126-hr event	T10-13323	RTI	Br	35	0.221	0.014	0.008	0.274	0.014	0.002	0.230
126-hr event	T10-13323	RTI	Rb	37	0.008	0.006	0.007	0.016	0.004	0.002	-----
126-hr event	T10-13323	RTI	Sr	38	0.020	0.006	0.006	0.016	0.002	0.003	-----
126-hr event	T10-13323	RTI	Zr	40	0.000	0.023	0.071	0.000	0.000	0.005	-----
126-hr event	T10-13323	RTI	Pb	82	0.175	0.019	0.018	0.144	0.010	0.003	-----
162-hr event	T10-13335	DRI	Na	11	13.211	0.849	0.219	15.510	1.324	1.045	-----
162-hr event	T10-13335	DRI	Mg	12	0.000	0.149	0.151	1.364	0.159	0.327	-----
162-hr event	T10-13335	DRI	Al	13	2.557	0.040	0.045	4.336	0.249	0.157	3.120
162-hr event	T10-13335	DRI	Si	14	16.354	0.088	0.023	23.656	1.195	0.084	17.210
162-hr event	T10-13335	DRI	P	15	0.000	0.005	0.004	0.000	0.000	0.051	-----
162-hr event	T10-13335	DRI	S	16	48.848	0.175	0.004	47.034	2.357	0.030	46.004
162-hr event	T10-13335	DRI	Cl	17	0.220	0.006	0.009	0.000	0.000	0.018	-----
162-hr event	T10-13335	DRI	K	19	4.436	0.012	0.005	4.569	0.230	0.009	4.811
162-hr event	T10-13335	DRI	Ca	20	3.033	0.028	0.009	3.369	0.170	0.005	3.121
162-hr event	T10-13335	DRI	Ti	22	0.315	0.008	0.008	0.300	0.016	0.003	0.299
162-hr event	T10-13335	DRI	V	23	0.034	0.005	0.001	0.045	0.005	0.002	-----
162-hr event	T10-13335	DRI	Cr	24	0.018	0.005	0.002	0.021	0.002	0.001	-----
162-hr event	T10-13335	DRI	Mn	25	0.105	0.016	0.005	0.103	0.006	0.001	-----
162-hr event	T10-13335	DRI	Fe	26	3.899	0.013	0.006	3.801	0.191	0.002	3.734
162-hr event	T10-13335	DRI	Ni	28	0.010	0.014	0.001	0.010	0.001	0.002	-----
162-hr event	T10-13335	DRI	Cu	29	0.131	0.018	0.005	0.123	0.007	0.002	-----
162-hr event	T10-13335	DRI	Zn	30	0.670	0.007	0.004	0.660	0.034	0.002	0.649
162-hr event	T10-13335	DRI	As	33	0.000	0.005	0.002	0.051	0.005	0.009	-----
162-hr event	T10-13335	DRI	Se	34	0.000	0.005	0.012	0.027	0.002	0.001	-----
162-hr event	T10-13335	DRI	Br	35	0.237	0.006	0.003	0.294	0.015	0.002	0.273
162-hr event	T10-13335	DRI	Rb	37	0.000	0.005	0.002	0.016	0.004	0.002	-----
162-hr event	T10-13335	DRI	Sr	38	0.050	0.005	0.002	0.035	0.002	0.003	-----
162-hr event	T10-13335	DRI	Zr	40	0.013	0.008	0.007	0.000	0.000	0.005	-----
162-hr event	T10-13335	DRI	Pb	82	0.287	0.006	0.006	0.284	0.016	0.003	0.279
162-hr event	T10-13336	DRI	Na	11	12.218	0.816	0.219	11.885	1.000	1.027	-----
162-hr event	T10-13336	DRI	Mg	12	0.262	0.150	0.151	0.855	0.159	0.325	-----
162-hr event	T10-13336	DRI	Al	13	3.026	0.042	0.045	5.688	0.321	0.156	3.120
162-hr event	T10-13336	DRI	Si	14	17.221	0.092	0.023	24.867	1.256	0.084	17.210
162-hr event	T10-13336	DRI	P	15	0.000	0.005	0.004	0.000	0.000	0.050	-----
162-hr event	T10-13336	DRI	S	16	47.066	0.168	0.004	45.915	2.301	0.030	46.004
162-hr event	T10-13336	DRI	Cl	17	0.197	0.006	0.009	0.000	0.000	0.018	-----
162-hr event	T10-13336	DRI	K	19	4.430	0.012	0.005	4.700	0.237	0.009	4.811
162-hr event	T10-13336	DRI	Ca	20	3.084	0.028	0.009	3.496	0.176	0.005	3.121
162-hr event	T10-13336	DRI	Ti	22	0.341	0.008	0.008	0.304	0.016	0.002	0.299
162-hr event	T10-13336	DRI	V	23	0.040	0.005	0.001	0.053	0.006	0.002	-----
162-hr event	T10-13336	DRI	Cr	24	0.026	0.005	0.002	0.022	0.002	0.001	-----

Table 14. XRF PT Results (25-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			UCD (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
162-hr event	T10-13336	DRI	Mn	25	0.126	0.016	0.005	0.108	0.006	0.001	-----
162-hr event	T10-13336	DRI	Fe	26	4.001	0.014	0.006	3.966	0.199	0.002	3.734
162-hr event	T10-13336	DRI	Ni	28	0.019	0.014	0.001	0.008	0.001	0.002	-----
162-hr event	T10-13336	DRI	Cu	29	0.145	0.018	0.005	0.122	0.007	0.002	-----
162-hr event	T10-13336	DRI	Zn	30	0.683	0.007	0.004	0.679	0.035	0.002	0.649
162-hr event	T10-13336	DRI	As	33	0.000	0.005	0.002	0.053	0.005	0.009	-----
162-hr event	T10-13336	DRI	Se	34	0.000	0.005	0.012	0.026	0.002	0.001	-----
162-hr event	T10-13336	DRI	Br	35	0.268	0.006	0.003	0.298	0.015	0.002	0.273
162-hr event	T10-13336	DRI	Rb	37	0.016	0.005	0.002	0.015	0.004	0.002	-----
162-hr event	T10-13336	DRI	Sr	38	0.033	0.005	0.002	0.038	0.003	0.003	-----
162-hr event	T10-13336	DRI	Zr	40	0.015	0.008	0.007	0.005	0.002	0.005	-----
162-hr event	T10-13336	DRI	Pb	82	0.272	0.006	0.006	0.287	0.016	0.003	0.279
162-hr event	T10-13337	RTI	Na	11	4.529	0.381	0.054	7.365	0.691	0.987	-----
162-hr event	T10-13337	RTI	Mg	12	0.477	0.044	0.016	0.881	0.155	0.314	-----
162-hr event	T10-13337	RTI	Al	13	3.692	0.263	0.058	5.381	0.301	0.151	3.120
162-hr event	T10-13337	RTI	Si	14	18.428	1.216	0.032	23.269	1.176	0.081	17.210
162-hr event	T10-13337	RTI	P	15	0.202	0.031	0.016	0.000	0.000	0.049	-----
162-hr event	T10-13337	RTI	S	16	43.032	2.156	0.015	43.622	2.187	0.030	46.004
162-hr event	T10-13337	RTI	Cl	17	0.289	0.020	0.011	0.000	0.000	0.018	-----
162-hr event	T10-13337	RTI	K	19	4.906	0.246	0.007	4.519	0.228	0.009	4.811
162-hr event	T10-13337	RTI	Ca	20	3.224	0.162	0.005	3.599	0.181	0.005	3.121
162-hr event	T10-13337	RTI	Ti	22	0.303	0.021	0.015	0.306	0.016	0.002	0.299
162-hr event	T10-13337	RTI	V	23	0.028	0.007	0.011	0.044	0.005	0.002	-----
162-hr event	T10-13337	RTI	Cr	24	0.025	0.005	0.008	0.018	0.002	0.001	-----
162-hr event	T10-13337	RTI	Mn	25	0.118	0.008	0.007	0.105	0.006	0.001	-----
162-hr event	T10-13337	RTI	Fe	26	3.991	0.200	0.008	3.895	0.196	0.002	3.734
162-hr event	T10-13337	RTI	Ni	28	0.015	0.002	0.004	0.011	0.001	0.002	-----
162-hr event	T10-13337	RTI	Cu	29	0.135	0.008	0.006	0.119	0.007	0.002	-----
162-hr event	T10-13337	RTI	Zn	30	0.699	0.036	0.005	0.643	0.033	0.002	0.649
162-hr event	T10-13337	RTI	As	33	0.037	0.009	0.007	0.052	0.005	0.009	-----
162-hr event	T10-13337	RTI	Se	34	0.021	0.006	0.009	0.027	0.002	0.001	-----
162-hr event	T10-13337	RTI	Br	35	0.261	0.016	0.008	0.278	0.014	0.002	0.273
162-hr event	T10-13337	RTI	Rb	37	0.012	0.006	0.007	0.018	0.004	0.002	-----
162-hr event	T10-13337	RTI	Sr	38	0.050	0.007	0.006	0.035	0.002	0.003	-----
162-hr event	T10-13337	RTI	Zr	40	0.000	0.023	0.071	0.000	0.000	0.005	-----
162-hr event	T10-13337	RTI	Pb	82	0.262	0.025	0.018	0.268	0.015	0.003	0.279
162-hr event	T10-13338	RTI	Na	11	5.290	0.443	0.054	15.336	1.275	1.017	-----
162-hr event	T10-13338	RTI	Mg	12	0.736	0.059	0.016	1.184	0.159	0.320	-----
162-hr event	T10-13338	RTI	Al	13	3.595	0.256	0.058	5.361	0.302	0.154	3.120
162-hr event	T10-13338	RTI	Si	14	18.445	1.217	0.032	23.417	1.183	0.082	17.210
162-hr event	T10-13338	RTI	P	15	0.235	0.032	0.016	0.000	0.000	0.050	-----
162-hr event	T10-13338	RTI	S	16	44.911	2.250	0.015	44.737	2.242	0.030	46.004
162-hr event	T10-13338	RTI	Cl	17	0.315	0.021	0.011	0.000	0.000	0.018	-----
162-hr event	T10-13338	RTI	K	19	4.965	0.249	0.007	4.465	0.225	0.009	4.811

Table 14. XRF PT Results (25-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			UCD (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
162-hr event	T10-13338	RTI	Ca	20	3.047	0.153	0.005	3.350	0.169	0.005	3.121
162-hr event	T10-13338	RTI	Ti	22	0.273	0.019	0.015	0.293	0.016	0.002	0.299
162-hr event	T10-13338	RTI	V	23	0.027	0.007	0.011	0.044	0.005	0.002	-----
162-hr event	T10-13338	RTI	Cr	24	0.027	0.005	0.008	0.022	0.002	0.001	-----
162-hr event	T10-13338	RTI	Mn	25	0.107	0.007	0.007	0.101	0.006	0.001	-----
162-hr event	T10-13338	RTI	Fe	26	3.867	0.194	0.008	3.762	0.189	0.002	3.734
162-hr event	T10-13338	RTI	Ni	28	0.015	0.002	0.004	0.006	0.001	0.002	-----
162-hr event	T10-13338	RTI	Cu	29	0.126	0.007	0.006	0.115	0.006	0.002	-----
162-hr event	T10-13338	RTI	Zn	30	0.695	0.035	0.005	0.654	0.033	0.002	0.649
162-hr event	T10-13338	RTI	As	33	0.029	0.009	0.007	0.047	0.005	0.009	-----
162-hr event	T10-13338	RTI	Se	34	0.027	0.006	0.009	0.026	0.002	0.001	-----
162-hr event	T10-13338	RTI	Br	35	0.250	0.016	0.008	0.288	0.015	0.002	0.273
162-hr event	T10-13338	RTI	Rb	37	0.021	0.006	0.007	0.013	0.004	0.002	-----
162-hr event	T10-13338	RTI	Sr	38	0.031	0.007	0.006	0.035	0.002	0.003	-----
162-hr event	T10-13338	RTI	Zr	40	0.021	0.045	0.071	0.000	0.000	0.005	-----
162-hr event	T10-13338	RTI	Pb	82	0.295	0.026	0.018	0.277	0.016	0.003	0.279
blank filter	T10-13351	DRI	Na	11	0.000	0.434	0.219	0.000	0.000	0.227	-----
blank filter	T10-13351	DRI	Mg	12	0.000	0.148	0.151	0.000	0.000	0.074	-----
blank filter	T10-13351	DRI	Al	13	0.001	0.029	0.045	0.000	0.000	0.036	-----
blank filter	T10-13351	DRI	Si	14	0.012	0.019	0.023	0.000	0.000	0.018	-----
blank filter	T10-13351	DRI	P	15	0.001	0.005	0.004	0.000	0.000	0.011	-----
blank filter	T10-13351	DRI	S	16	0.000	0.005	0.004	0.000	0.000	0.008	-----
blank filter	T10-13351	DRI	Cl	17	0.000	0.005	0.009	0.028	0.005	0.006	-----
blank filter	T10-13351	DRI	K	19	0.004	0.007	0.005	0.027	0.008	0.005	-----
blank filter	T10-13351	DRI	Ca	20	0.010	0.020	0.009	0.008	0.004	0.002	-----
blank filter	T10-13351	DRI	Ti	22	0.000	0.008	0.008	0.000	0.000	0.001	-----
blank filter	T10-13351	DRI	V	23	0.000	0.005	0.001	0.000	0.000	0.001	-----
blank filter	T10-13351	DRI	Cr	24	0.001	0.005	0.002	0.000	0.000	0.001	-----
blank filter	T10-13351	DRI	Mn	25	0.004	0.015	0.005	0.000	0.000	0.001	-----
blank filter	T10-13351	DRI	Fe	26	0.000	0.005	0.006	0.001	0.000	0.001	-----
blank filter	T10-13351	DRI	Ni	28	0.000	0.014	0.001	0.000	0.000	0.001	-----
blank filter	T10-13351	DRI	Cu	29	0.006	0.018	0.005	0.000	0.000	0.001	-----
blank filter	T10-13351	DRI	Zn	30	0.002	0.005	0.004	0.002	0.001	0.001	-----
blank filter	T10-13351	DRI	As	33	0.000	0.005	0.002	0.000	0.000	0.002	-----
blank filter	T10-13351	DRI	Se	34	0.000	0.005	0.012	0.000	0.000	0.001	-----
blank filter	T10-13351	DRI	Br	35	0.000	0.005	0.003	0.003	0.001	0.001	-----
blank filter	T10-13351	DRI	Rb	37	0.006	0.005	0.002	0.000	0.000	0.002	-----
blank filter	T10-13351	DRI	Sr	38	0.000	0.005	0.002	0.000	0.000	0.003	-----
blank filter	T10-13351	DRI	Zr	40	0.000	0.008	0.007	0.000	0.000	0.005	-----
blank filter	T10-13351	DRI	Pb	82	0.000	0.006	0.006	0.008	0.001	0.002	-----
blank filter	T10-13352	DRI	Na	11	0.000	0.433	0.219	0.000	0.000	0.220	-----
blank filter	T10-13352	DRI	Mg	12	0.047	0.149	0.151	0.212	0.054	0.071	-----
blank filter	T10-13352	DRI	Al	13	0.040	0.029	0.045	0.000	0.000	0.034	-----
blank filter	T10-13352	DRI	Si	14	0.000	0.018	0.023	0.085	0.029	0.017	-----

Table 14. XRF PT Results (25-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			UCD (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
blank filter	T10-13352	DRI	P	15	0.001	0.005	0.004	0.000	0.000	0.010	-----
blank filter	T10-13352	DRI	S	16	0.000	0.005	0.004	0.044	0.011	0.007	-----
blank filter	T10-13352	DRI	Cl	17	0.000	0.005	0.009	0.000	0.000	0.005	-----
blank filter	T10-13352	DRI	K	19	0.000	0.007	0.005	0.000	0.000	0.005	-----
blank filter	T10-13352	DRI	Ca	20	0.000	0.020	0.009	0.000	0.000	0.001	-----
blank filter	T10-13352	DRI	Ti	22	0.006	0.008	0.008	0.000	0.000	0.001	-----
blank filter	T10-13352	DRI	V	23	0.000	0.005	0.001	0.000	0.000	0.001	-----
blank filter	T10-13352	DRI	Cr	24	0.000	0.005	0.002	0.000	0.000	0.001	-----
blank filter	T10-13352	DRI	Mn	25	0.000	0.015	0.005	0.001	0.000	0.001	-----
blank filter	T10-13352	DRI	Fe	26	0.000	0.005	0.006	0.003	0.001	0.001	-----
blank filter	T10-13352	DRI	Ni	28	0.000	0.014	0.001	0.000	0.000	0.001	-----
blank filter	T10-13352	DRI	Cu	29	0.000	0.018	0.005	0.000	0.000	0.001	-----
blank filter	T10-13352	DRI	Zn	30	0.000	0.005	0.004	0.000	0.000	0.001	-----
blank filter	T10-13352	DRI	As	33	0.000	0.005	0.002	0.000	0.000	0.001	-----
blank filter	T10-13352	DRI	Se	34	0.000	0.005	0.012	0.000	0.000	0.001	-----
blank filter	T10-13352	DRI	Br	35	0.000	0.005	0.003	0.000	0.000	0.001	-----
blank filter	T10-13352	DRI	Rb	37	0.003	0.005	0.002	0.000	0.000	0.002	-----
blank filter	T10-13352	DRI	Sr	38	0.001	0.005	0.002	0.000	0.000	0.003	-----
blank filter	T10-13352	DRI	Zr	40	0.003	0.008	0.007	0.000	0.000	0.005	-----
blank filter	T10-13352	DRI	Pb	82	0.000	0.006	0.006	0.010	0.003	0.002	-----
blank filter	T10-13353	RTI	Na	11	0.064	0.021	0.054	0.535	0.163	0.233	-----
blank filter	T10-13353	RTI	Mg	12	0.011	0.008	0.016	0.423	0.123	0.076	-----
blank filter	T10-13353	RTI	Al	13	0.022	0.016	0.058	0.000	0.000	0.037	-----
blank filter	T10-13353	RTI	Si	14	0.000	0.012	0.032	0.117	0.027	0.019	-----
blank filter	T10-13353	RTI	P	15	0.000	0.005	0.016	0.063	0.011	0.011	-----
blank filter	T10-13353	RTI	S	16	0.011	0.004	0.015	0.025	0.005	0.008	-----
blank filter	T10-13353	RTI	Cl	17	0.000	0.004	0.011	0.000	0.000	0.006	-----
blank filter	T10-13353	RTI	K	19	0.003	0.003	0.007	0.000	0.000	0.005	-----
blank filter	T10-13353	RTI	Ca	20	0.000	0.003	0.005	0.006	0.001	0.002	-----
blank filter	T10-13353	RTI	Ti	22	0.000	0.005	0.015	0.000	0.000	0.001	-----
blank filter	T10-13353	RTI	V	23	0.000	0.004	0.011	0.000	0.000	0.001	-----
blank filter	T10-13353	RTI	Cr	24	0.000	0.003	0.008	0.001	0.000	0.001	-----
blank filter	T10-13353	RTI	Mn	25	0.000	0.002	0.007	0.000	0.000	0.001	-----
blank filter	T10-13353	RTI	Fe	26	0.000	0.002	0.008	0.003	0.001	0.001	-----
blank filter	T10-13353	RTI	Ni	28	0.000	0.002	0.004	0.004	0.001	0.001	-----
blank filter	T10-13353	RTI	Cu	29	0.000	0.001	0.006	0.004	0.001	0.001	-----
blank filter	T10-13353	RTI	Zn	30	0.000	0.002	0.005	0.000	0.000	0.001	-----
blank filter	T10-13353	RTI	As	33	0.002	0.005	0.007	0.000	0.000	0.001	-----
blank filter	T10-13353	RTI	Se	34	0.000	0.002	0.009	0.000	0.000	0.001	-----
blank filter	T10-13353	RTI	Br	35	0.005	0.005	0.008	0.000	0.000	0.001	-----
blank filter	T10-13353	RTI	Rb	37	0.000	0.002	0.007	0.000	0.000	0.002	-----
blank filter	T10-13353	RTI	Sr	38	0.000	0.002	0.006	0.000	0.000	0.003	-----
blank filter	T10-13353	RTI	Zr	40	0.031	0.038	0.071	0.000	0.000	0.005	-----
blank filter	T10-13353	RTI	Pb	82	0.000	0.005	0.018	0.005	0.001	0.002	-----

Table 14. XRF PT Results (25-mm Filters)

Sample Description	Sample ID	Test Lab	Element	Z	Test Lab (µg/filter)			UCD (µg/filter)			Median* (µg/filter)
					Result	Uncert.	MDL	Result	Uncert.	MDL	
blank filter	T10-13354	RTI	Na	11	0.000	0.023	0.054	0.000	0.000	0.219	-----
blank filter	T10-13354	RTI	Mg	12	0.000	0.008	0.016	0.000	0.000	0.070	-----
blank filter	T10-13354	RTI	Al	13	0.006	0.015	0.058	0.000	0.000	0.034	-----
blank filter	T10-13354	RTI	Si	14	0.009	0.008	0.032	0.000	0.000	0.017	-----
blank filter	T10-13354	RTI	P	15	0.000	0.005	0.016	0.000	0.000	0.010	-----
blank filter	T10-13354	RTI	S	16	0.000	0.006	0.015	0.000	0.000	0.007	-----
blank filter	T10-13354	RTI	Cl	17	0.000	0.004	0.011	0.000	0.000	0.005	-----
blank filter	T10-13354	RTI	K	19	0.000	0.002	0.007	0.000	0.000	0.005	-----
blank filter	T10-13354	RTI	Ca	20	0.000	0.003	0.005	0.006	0.001	0.001	-----
blank filter	T10-13354	RTI	Ti	22	0.000	0.005	0.015	0.003	0.001	0.001	-----
blank filter	T10-13354	RTI	V	23	0.007	0.004	0.011	0.000	0.000	0.001	-----
blank filter	T10-13354	RTI	Cr	24	0.000	0.003	0.008	0.000	0.000	0.001	-----
blank filter	T10-13354	RTI	Mn	25	0.001	0.003	0.007	0.000	0.000	0.001	-----
blank filter	T10-13354	RTI	Fe	26	0.002	0.003	0.008	0.002	0.001	0.001	-----
blank filter	T10-13354	RTI	Ni	28	0.000	0.001	0.004	0.002	0.001	0.001	-----
blank filter	T10-13354	RTI	Cu	29	0.000	0.001	0.006	0.002	0.001	0.001	-----
blank filter	T10-13354	RTI	Zn	30	0.000	0.001	0.005	0.005	0.001	0.001	-----
blank filter	T10-13354	RTI	As	33	0.001	0.003	0.007	0.000	0.000	0.001	-----
blank filter	T10-13354	RTI	Se	34	0.005	0.005	0.009	0.000	0.000	0.001	-----
blank filter	T10-13354	RTI	Br	35	0.000	0.002	0.008	0.000	0.000	0.001	-----
blank filter	T10-13354	RTI	Rb	37	0.000	0.002	0.007	0.000	0.000	0.002	-----
blank filter	T10-13354	RTI	Sr	38	0.000	0.002	0.006	0.000	0.000	0.003	-----
blank filter	T10-13354	RTI	Zr	40	0.007	0.038	0.071	0.003	0.002	0.005	-----
blank filter	T10-13354	RTI	Pb	82	0.000	0.005	0.018	0.008	0.002	0.002	-----

**** Median was calculated only when the result from all reporting labs was greater than three times the uncertainty.***