TECHNICAL MEMORANDUM

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SUBJECT: Experimental Inter-comparison of Speciation Laboratories

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 TOA carbon, CSN 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	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
T09-13066	T8126704	30-Nov-09	48-hour	CARB
T09-13067	T8126705	30-Nov-09	48-hour	CARB
T09-13068	T8126706	02-Dec-09	24-hour	CARB
T09-13069	T8126707	02-Dec-09	24-hour	CARB
T09-13070	T8126708	02-Dec-09	24-hour	CARB
T09-13071	T8126709	03-Dec-09	22-hour	CARB
T09-13072	T8126710	03-Dec-09	22-hour	CARB
T09-13076	T8126714	30-Nov-09	48-hour	DRI
T09-13077	T8126716	30-Nov-09	48-hour	DRI
T09-13078	T8126717	02-Dec-09	24-hour	DRI
T09-13079	T8126718	02-Dec-09	24-hour	DRI
T09-13080	T8126719	02-Dec-09	24-hour	DRI
T09-13081	T8126720	03-Dec-09	22-hour	DRI
T09-13082	T8126721	03-Dec-09	22-hour	DRI
T09-13086	T8126725	30-Nov-09	48-hour	ODEQ
T09-13087	T8126726	30-Nov-09	48-hour	ODEQ
T09-13088	T8126727	02-Dec-09	24-hour	ODEQ
T09-13089	T8126728	02-Dec-09	24-hour	ODEQ

Filter ID	Serial Number	Sample Start	Event Duration	Receiving Lab
T09-13090	T8126730	02-Dec-09	24-hour	ODEQ
T09-13091	T8126731	03-Dec-09	22-hour	ODEQ
T09-13092	T8126732	03-Dec-09	22-hour	ODEQ
T09-13096	T8126736	30-Nov-09	48-hour	RTI
T09-13097	T8126737	30-Nov-09	48-hour	RTI
T09-13098	T8126738	02-Dec-09	24-hour	RTI
T09-13099	T8126739	02-Dec-09	24-hour	RTI
T09-13100	T8126741	02-Dec-09	24-hour	RTI
T09-13101	T8126742	03-Dec-09	22-hour	RTI
T09-13102	T8126743	03-Dec-09	22-hour	RTI
T09-13106	T8126747	30-Nov-09	48-hour	AQMD
T09-13107	T8126748	30-Nov-09	48-hour	AQMD
T09-13108	T8126749	02-Dec-09	24-hour	AQMD
T09-13109	T8126750	02-Dec-09	24-hour	AQMD
T09-13110	T8126751	02-Dec-09	24-hour	AQMD
T09-13111	T8126752	03-Dec-09	22-hour	AQMD
T09-13112	T8126753	03-Dec-09	22-hour	AQMD

Table 2 shows thirty-five filters that were loaded during three 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, ten replicates were created during a 48-hour collection event that started on November 30, and two of these replicates were submitted to each lab for analysis. Similarly, fifteen replicates were created during a 24-hour collection event that started on December 2, and three 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

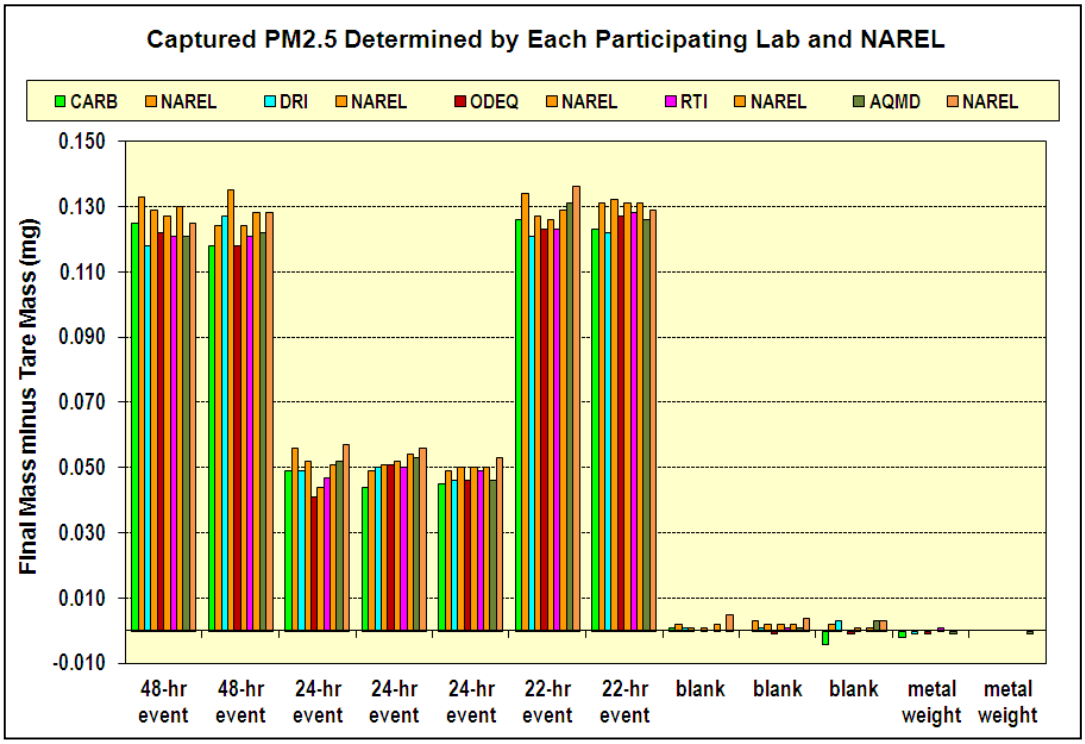
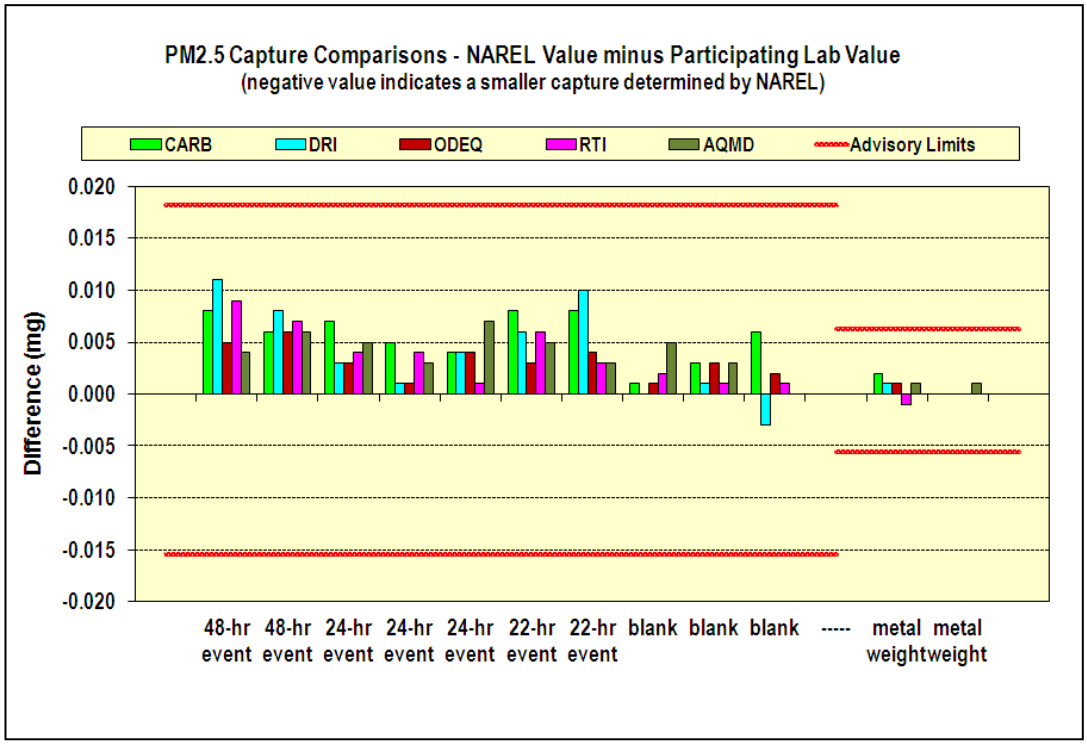


Figure 2 presents the inter-laboratory differences along with advisory limits. Inter-laboratory differences were calculated by subtracting the $PM_{2.5}$ capture value determined at each speciation lab from the capture value determined at NAREL. Notice that a negative bar on the figure 2 graph represents 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
N09-12915	Nylon®	07-Jan-09	128-hour	CARB	CSN
N09-12916	Nylon®	07-Jan-09	128-hour	CARB	CSN
N09-12927	Nylon®	30-Mar-09	176-hour	CARB	CSN
N09-12928	Nylon®	30-Mar-09	176-hour	CARB	CSN
N09-12917	Nylon®	07-Jan-09	128-hour	DRI	CSN
N09-12918	Nylon®	07-Jan-09	128-hour	DRI	CSN
N09-12929	Nylon®	30-Mar-09	176-hour	DRI	CSN
N09-12930	Nylon®	30-Mar-09	176-hour	DRI	CSN
N09-12919	Nylon®	07-Jan-09	128-hour	ODEQ	CSN
N09-12920	Nylon®	07-Jan-09	128-hour	ODEQ	CSN
N09-12931	Nylon®	30-Mar-09	176-hour	ODEQ	CSN
N09-12932	Nylon®	30-Mar-09	176-hour	ODEQ	CSN
N09-12921	Nylon®	07-Jan-09	128-hour	RTI	CSN
N09-12922	Nylon®	07-Jan-09	128-hour	RTI	CSN
N09-12933	Nylon®	30-Mar-09	176-hour	RTI	CSN
N09-12934	Nylon®	30-Mar-09	176-hour	RTI	CSN
N09-12923	Nylon®	07-Jan-09	128-hour	AQMD	CSN
N09-12924	Nylon®	07-Jan-09	128-hour	AQMD	CSN
N09-12935	Nylon®	30-Mar-09	176-hour	AQMD	CSN
N09-12936	Nylon®	30-Mar-09	176-hour	AQMD	CSN
N09-12925	Nylon®	07-Jan-09	128-hour	NAREL	CSN
N09-12926	Nylon®	07-Jan-09	128-hour	NAREL	CSN
N09-12937	Nylon®	30-Mar-09	176-hour	NAREL	CSN
N09-12938	Nylon®	30-Mar-09	176-hour	NAREL	CSN
T09-12947	Teflon®	13-Feb-09	136-hour	DRI	CSN

Filter ID	Filter Medium	Sample Start	Event Duration	Receiving Lab	Method
T09-12948	Teflon®	13-Feb-09	136-hour	DRI	CSN
T09-12959	Teflon®	17-Mar-09	144-hour	DRI	CSN
T09-12960	Teflon®	17-Mar-09	144-hour	DRI	CSN
T09-12949	Teflon®	13-Feb-09	136-hour	NAREL	CSN
T09-12950	Teflon®	13-Feb-09	136-hour	NAREL	CSN
T09-12961	Teflon®	17-Mar-09	144-hour	NAREL	CSN
T09-12962	Teflon®	17-Mar-09	144-hour	NAREL	CSN
N09-12941	Nylon®	13-Feb-09	136-hour	RTI	IMPROVE
N09-12942	Nylon®	13-Feb-09	136-hour	RTI	IMPROVE
N09-12953	Nylon®	17-Mar-09	144-hour	RTI	IMPROVE
N09-12954	Nylon®	17-Mar-09	144-hour	RTI	IMPROVE
N09-12943	Nylon®	13-Feb-09	136-hour	NAREL	IMPROVE
N09-12944	Nylon®	13-Feb-09	136-hour	NAREL	IMPROVE
N09-12955	Nylon®	17-Mar-09	144-hour	NAREL	IMPROVE
N09-12956	Nylon®	17-Mar-09	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 January 7 and March 30. 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.

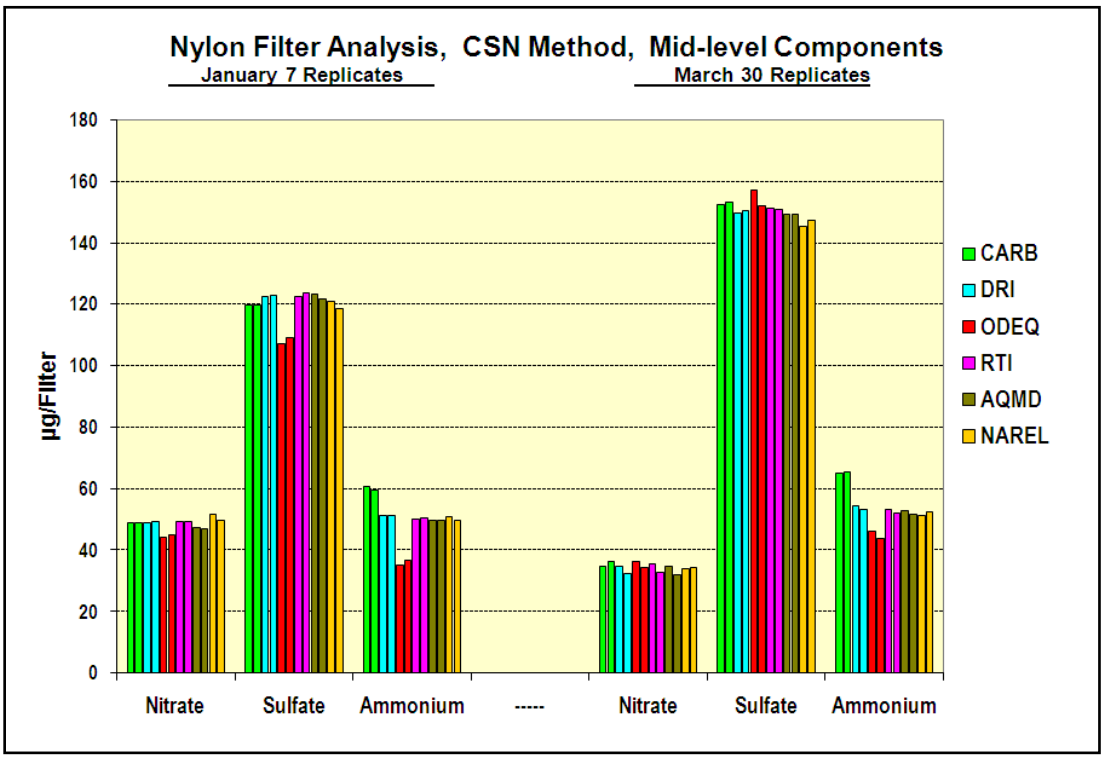
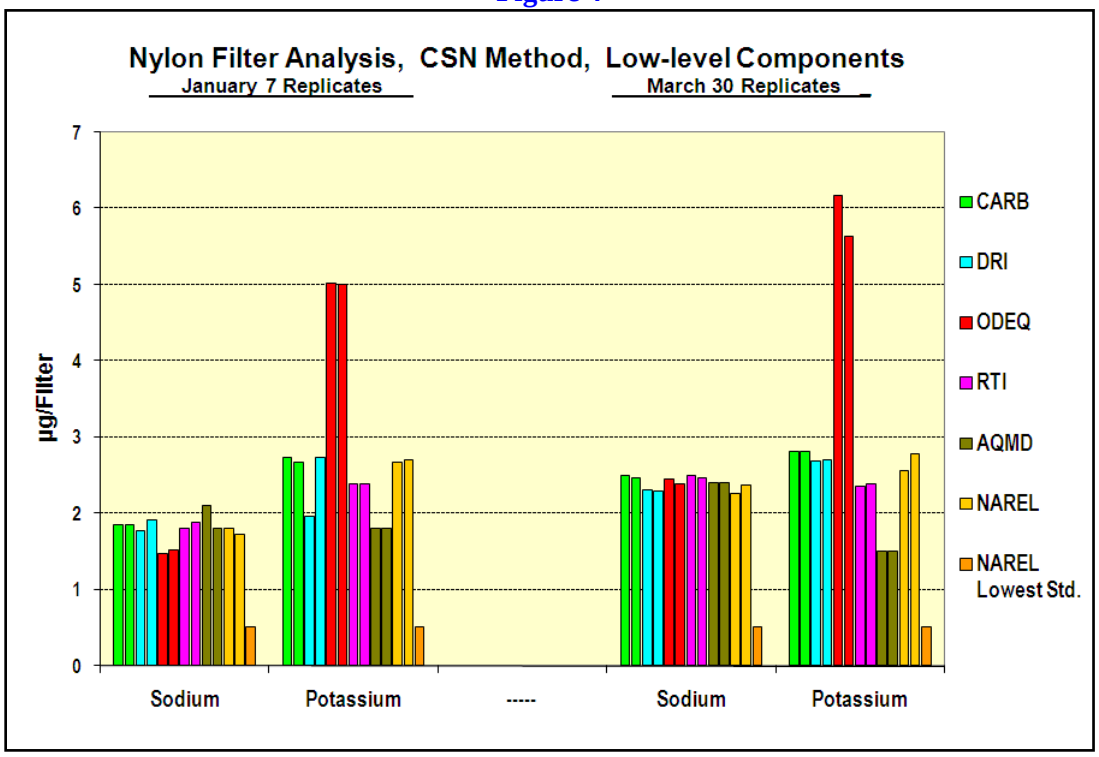


Figure 3

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. The potassium reported by ODEQ is noticeably higher than other labs and AQMD values are consistently lower.

Figure 4



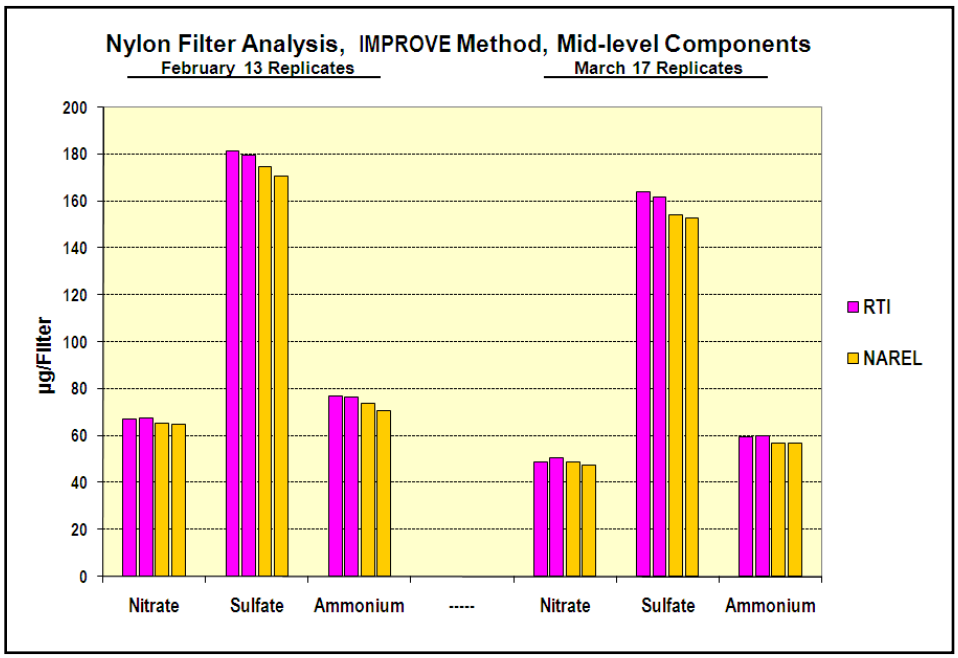
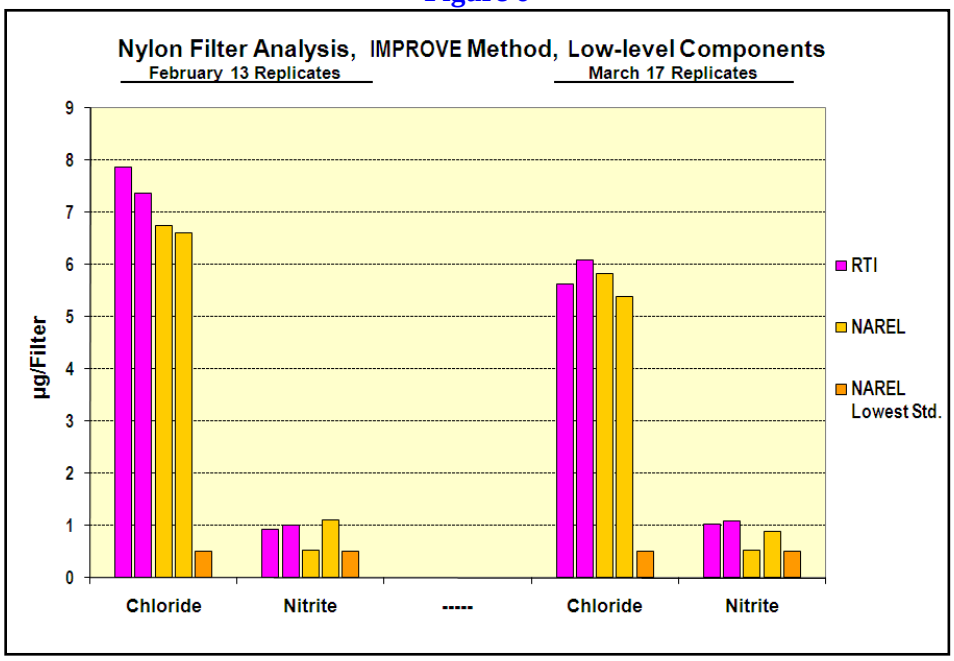


Figure 5

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 February 13 and March 17. 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. Good agreement between labs is observed in figures 5 and 6.

Figure 6



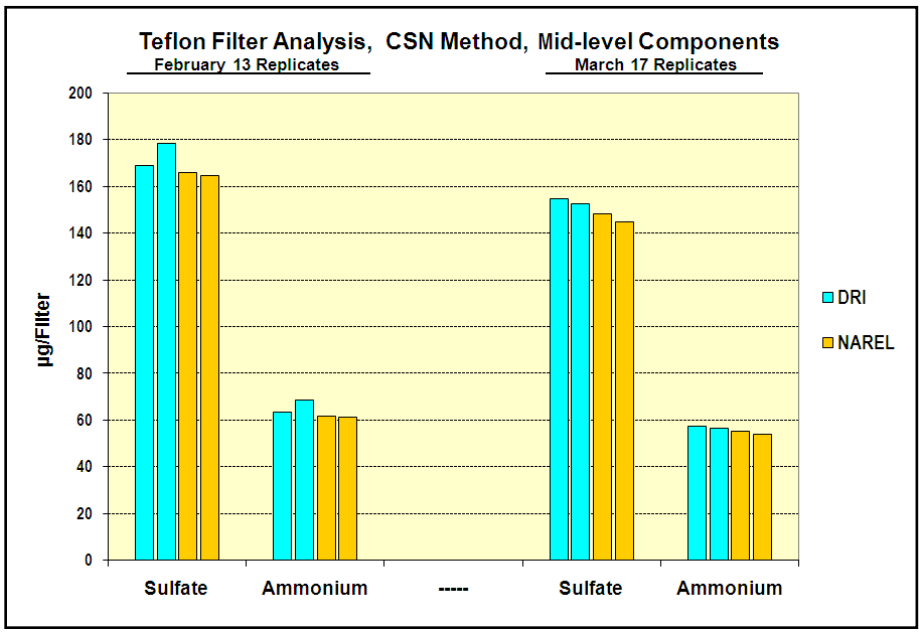
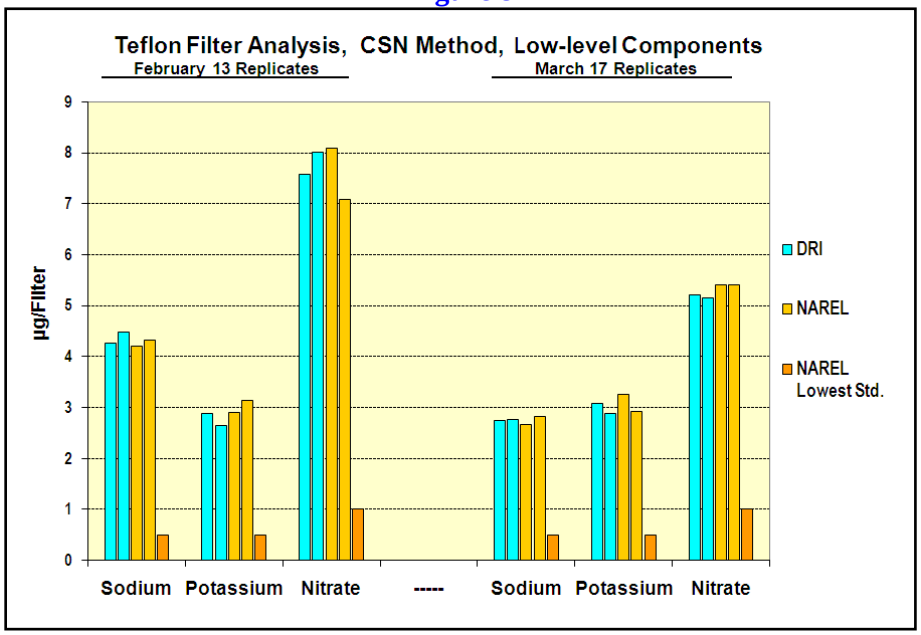


Figure 7

According to table 3, both Nylon® and Teflon® filters were loaded during the February 13 and March 17 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 approximately ten times higher than the nitrate values from the Teflon® filters shown in figure 8. Yet the Nylon® results for sulfate and ammonium shown in figure 5 are about the same as the results from Teflon® filters shown in figure 7.

Figures 7 and 8 show good precision for replicates analyzed at the same lab and also good agreement between labs. Blanks were provided to all of the labs for this study. Results from the blanks and from the loaded filters are available in table 11 at the end of this report.

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)
Q09-12985	quartz	29-Jan-09	160-hour	CARB	IMPROVE_A
Q09-12986	quartz	29-Jan-09	160-hour	CARB	IMPROVE_A
Q09-12997	quartz	09-Jul-09	226-hour	CARB	IMPROVE_A
Q09-12987	quartz	09-Jul-09	226-hour	CARB	IMPROVE_A
Q09-12988	quartz	29-Jan-09	160-hour	DRI	IMPROVE_A and CSN
Q09-12985	quartz	29-Jan-09	160-hour	DRI	IMPROVE_A and CSN
Q09-12999	quartz	09-Jul-09	226-hour	DRI	IMPROVE_A and CSN
Q09-13000	quartz	09-Jul-09	226-hour	DRI	IMPROVE_A and CSN
Q09-12989	quartz	29-Jan-09	160-hour	RTI	IMPROVE_A and CSN
Q09-12990	quartz	29-Jan-09	160-hour	RTI	IMPROVE_A and CSN
Q09-13001	quartz	09-Jul-09	226-hour	RTI	IMPROVE_A and CSN
Q09-13002	quartz	09-Jul-09	226-hour	RTI	IMPROVE_A and CSN
Q09-12991	quartz	29-Jan-09	160-hour	AQMD	IMPROVE_A
Q09-12992	quartz	29-Jan-09	160-hour	AQMD	IMPROVE_A
Q09-13003	quartz	09-Jul-09	226-hour	AQMD	IMPROVE_A
Q09-13004	quartz	09-Jul-09	226-hour	AQMD	IMPROVE_A
Q09-12993	quartz	29-Jan-09	160-hour	NAREL	IMPROVE_A and CSN
Q09-12994	quartz	29-Jan-09	160-hour	NAREL	IMPROVE_A and CSN
Q09-13005	quartz	09-Jul-09	226-hour	NAREL	IMPROVE_A and CSN
Q09-13006	quartz	09-Jul-09	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 160-hour winter event that started on January 29, and two of these replicates were submitted to each lab for analysis. Likewise, ten replicates were created during the 226-hour summer event that started on July 29, 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 several times using more than one instrument and also 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 that support the chemical speciation network which includes approximately 200 field sites.

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 among the 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, #7, #11	OC, EC, TC, OCsub, ECsub	2
			DRI Instr. #6, #7, #11	OC, EC, TC, OCsub, ECsub	3
			RTI Instr. #1	OC, EC, TC, OCsub, ECsub	4
			AQMD Instr. #2, #3	OC, EC, TC, OCsub, ECsub	5
		Sunset (dual-mode)	RTI Instr. F	OC, EC, TC, OCsub, ECsub	6
			NAREL Instr. #2	OC, EC, TC, OCsub, ECsub	7
CSN	TOT	DRI Model 2001	DRI Instr. #8, #12	OC, EC, TC, OCsub, ECsub	8
			DRI Instr. #8, #10, #12	OC, EC, TC, OCsub, ECsub	9
		Sunset (dual-mode)	RTI Instr. F	OC, EC, TC, OCsub	10
		Sunset (single-mode)	RTI Instr. T	OC, EC, TC, OCsub	11
			NAREL Instr. #1	OC, EC, TC, OCsub	12

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 (IS). 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

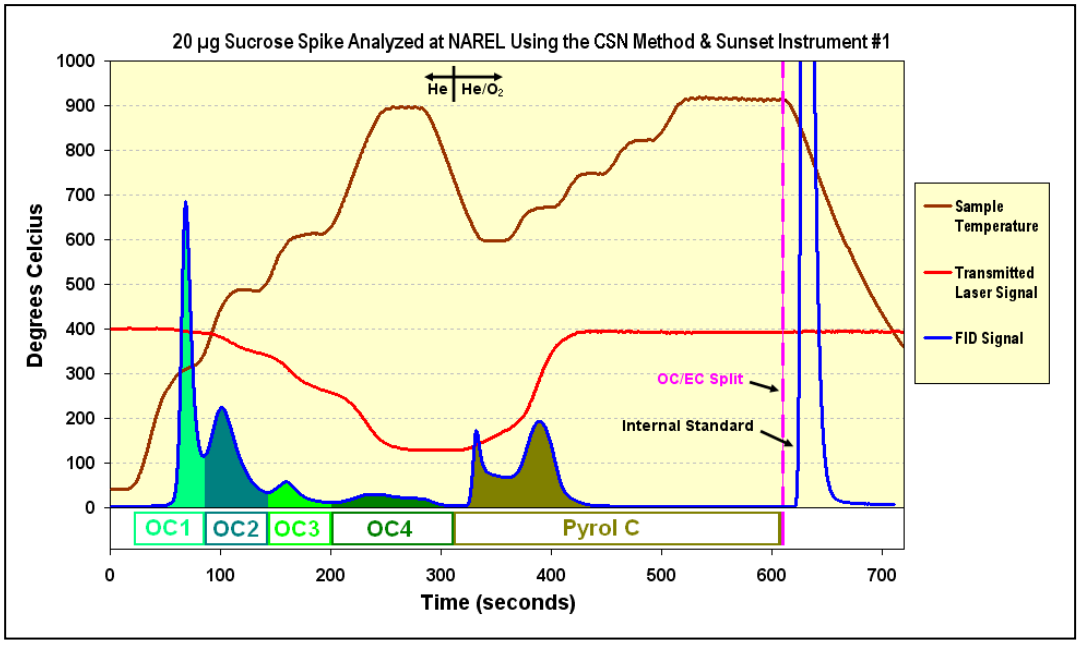


Figure 9 is a thermogram of a sucrose spike which was analyzed at NAREL as a routine calibration check sample. The sucrose spike contains no EC but has a strong tendency to char and form PyrolC.

After the raw data acquisition is complete, 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. Other carbon fractions may be calculated such as the OC subfractions: OC = OC1 + OC2 + OC3 + OC4 + PyrolC. Figure 9 shows an example of OC subfractions that were calculated by a Sunset instrument. EC subfractions may be calculated as well. For example, three EC subfractions have been reported for IMPROVE samples for many years. To better understand how the EC subfractions are calculated, we should look back at table 5 to 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.

EPA has been aware for several years that different TOA methods give different results for the carbon fractions and subfractions. Consequently EPA has decided to migrate to a single TOA carbon method. The three-year implementation plan includes 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 will replace the CSN TOT method at those field sites that receive 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 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.

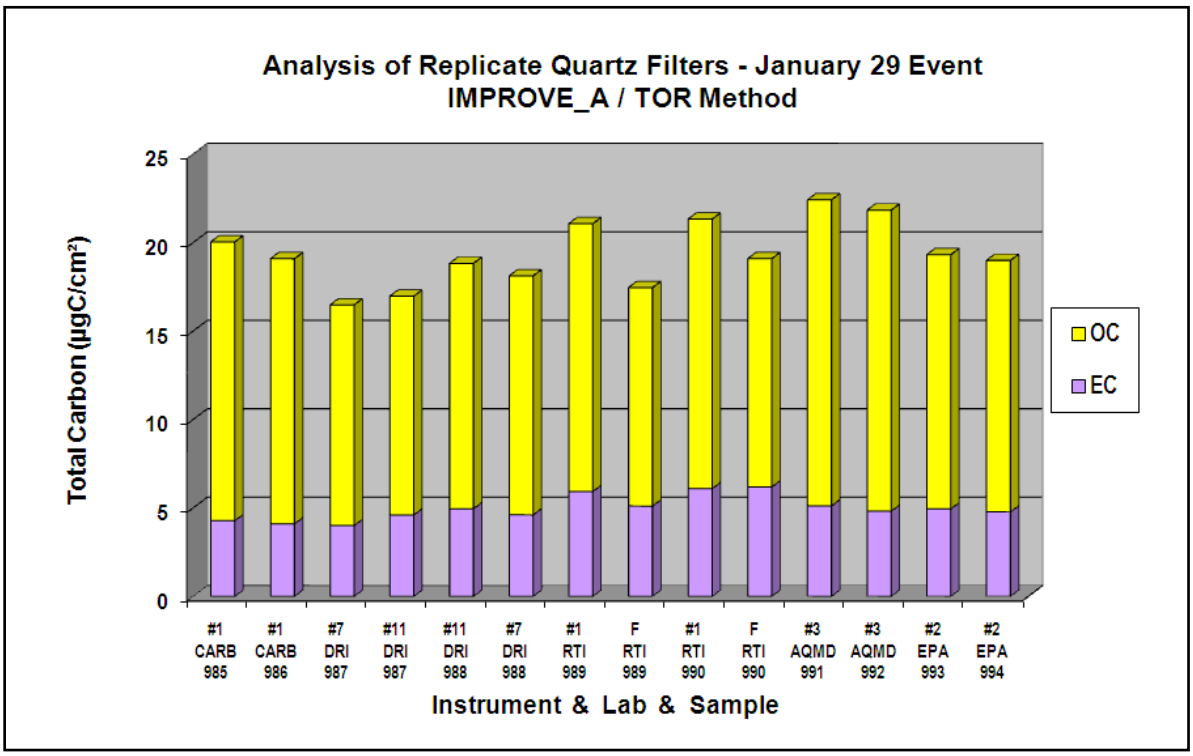
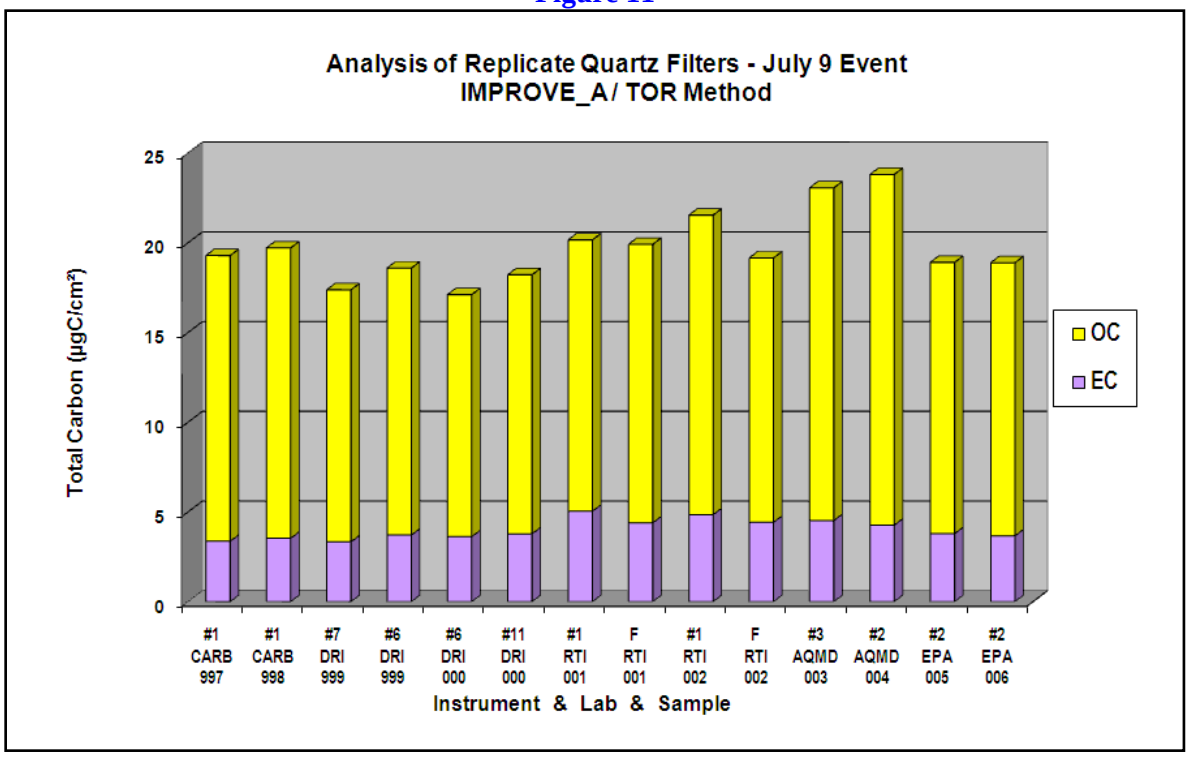


Figure 10

Figure 10 shows results from replicates that were created on January 29, and figure 11 shows the results from replicates created on July 9. 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



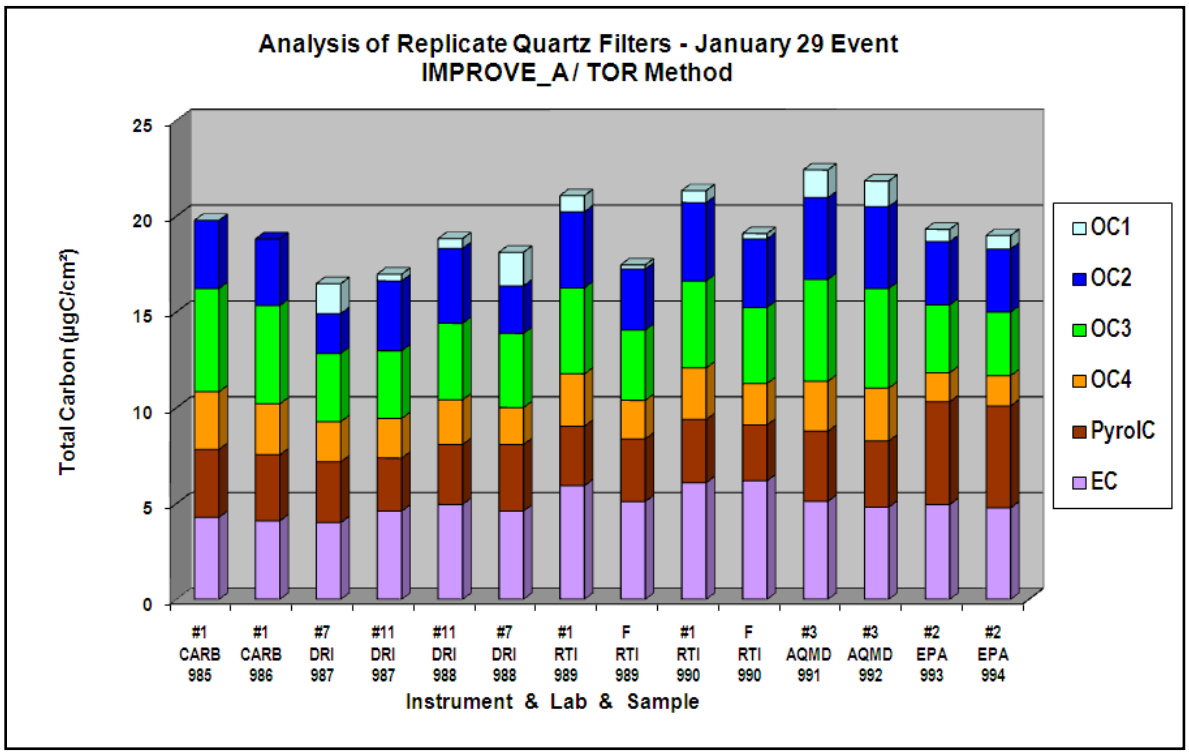
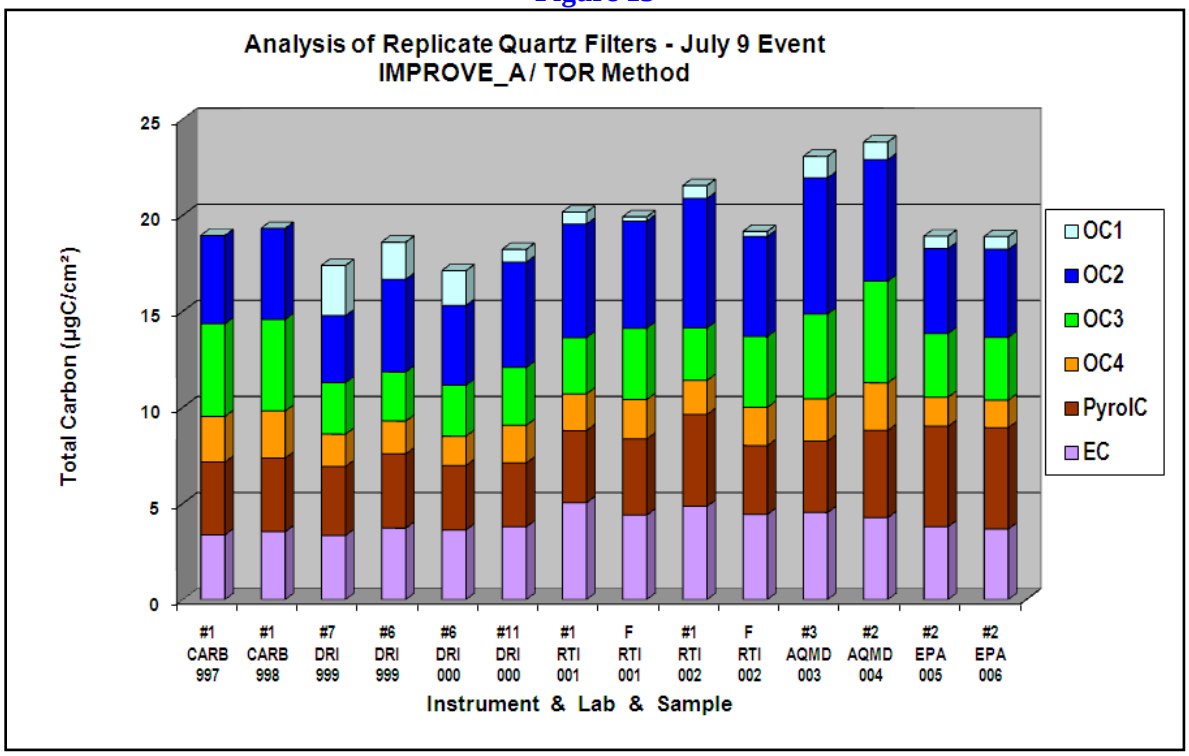


Figure 12

The results are presented again in figures 12 and 13 with more detail, and this time the OC subfractions are revealed. Even though all of the instruments used the same temperature protocol, there is noticeable variability for total carbon and also for the carbon fractions.

Figure 13



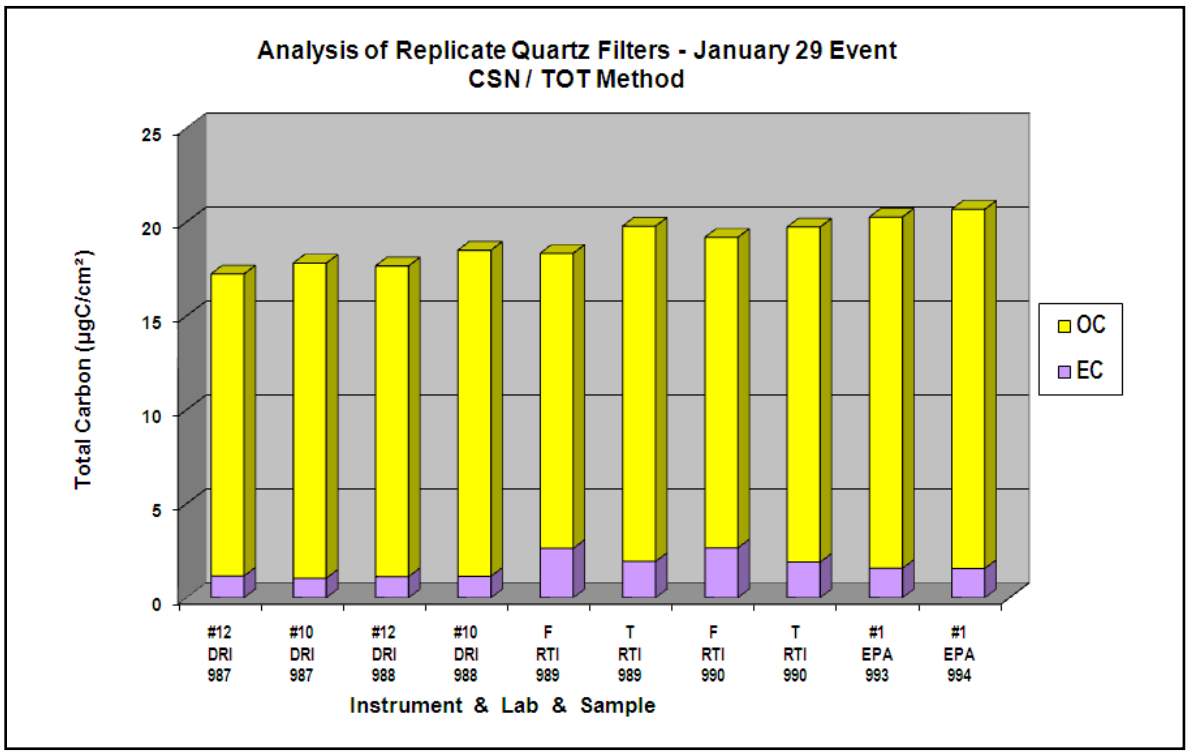
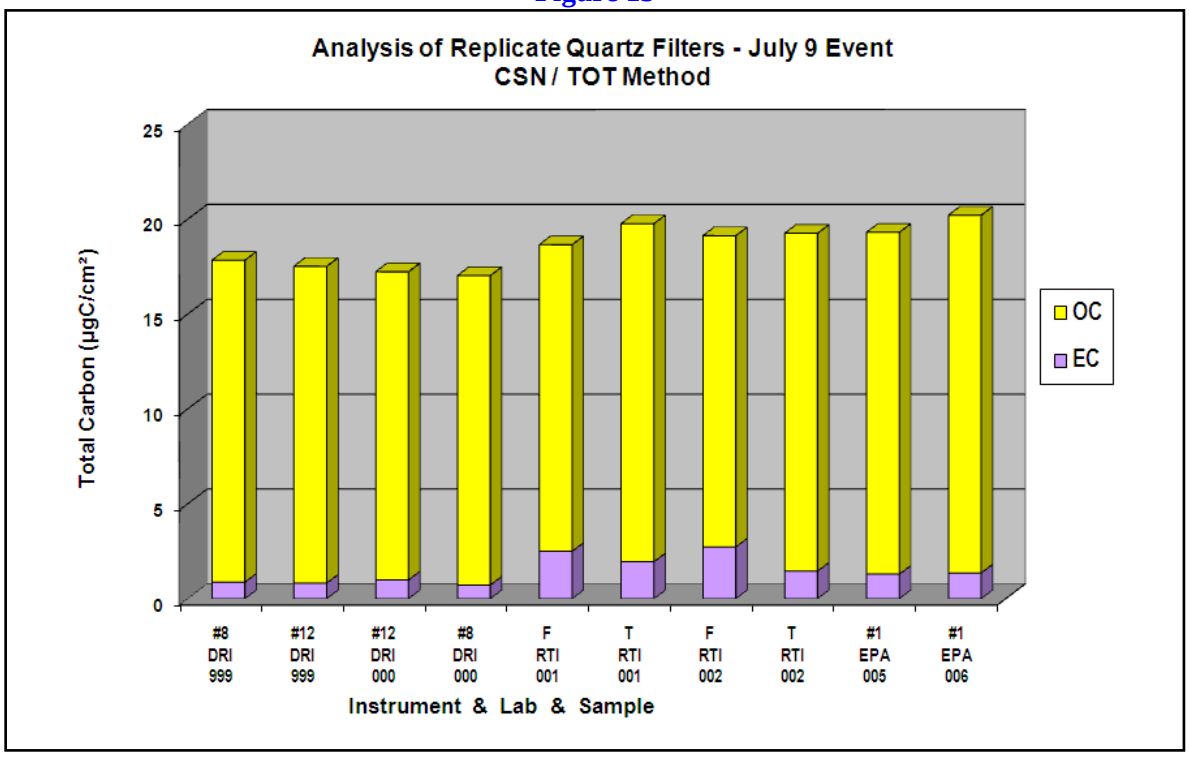


Figure 14

According to table 4 three labs were able to report results from more than one TOA method. Figures 14 and 15 show CSN TOT results from the January 29 and the July 9 replicates respectively. It is interesting to compare these results with the IMPROVE_A TOR results shown previously in figures 10 and 11. These results show better inter-laboratory agreement for total carbon. The most significant difference observed is the smaller EC produced by the CSN TOT method.

Figure 15



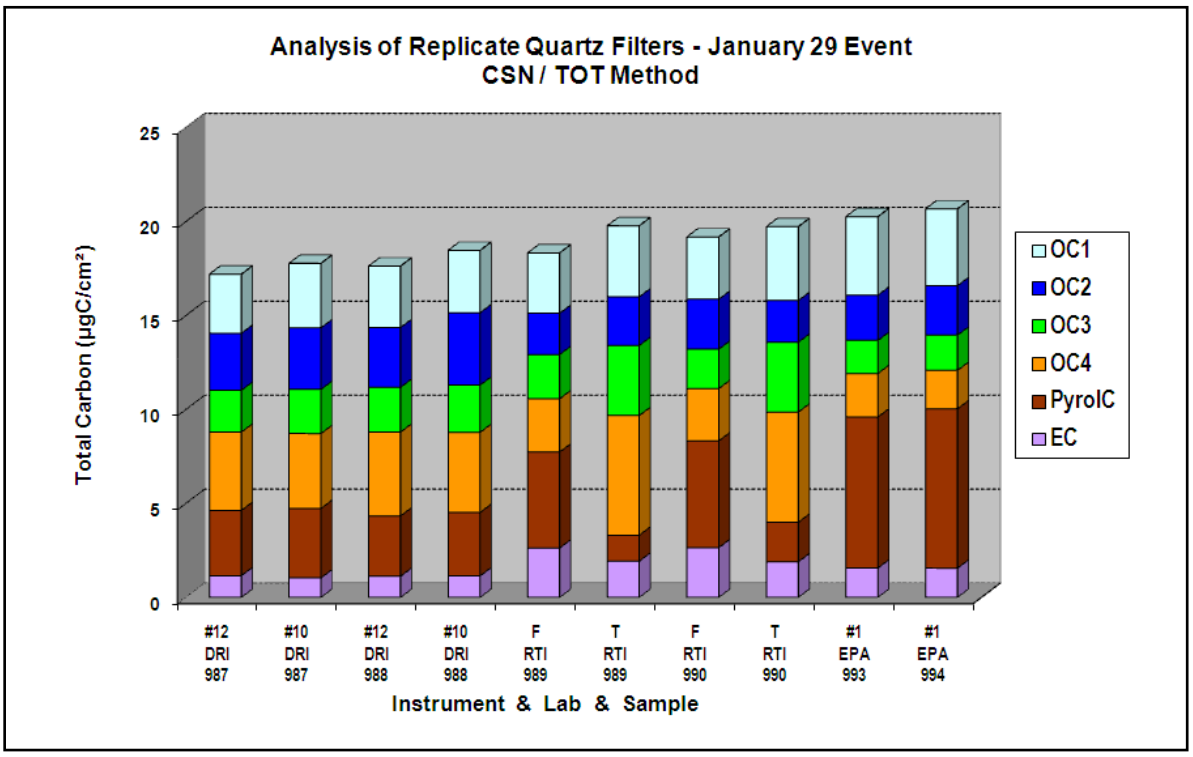
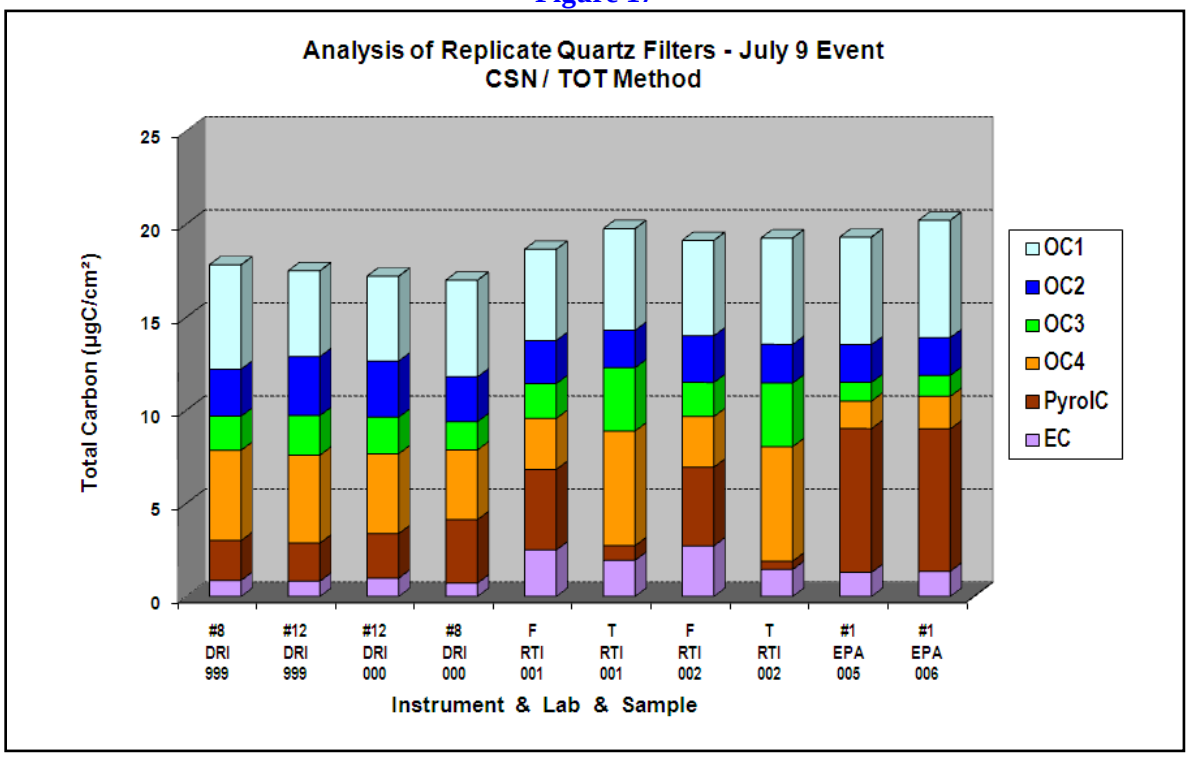


Figure 16

Figures 16 and 17 show the CSN TOT results again with more detail. Reasonably good inter-laboratory agreement is observed for the OC1, OC2 and OC3 subfractions. Worse agreement is observed for OC4 and PyrolC.

Figure 17



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
T09-13026	47-mm Teflon®	02/25/09	168-hour event	CARB	RTI
T09-13027	47-mm Teflon®	02/25/09	168-hour event	CARB	RTI
T09-13042	47-mm Teflon®	05/14/09	152-hour event	CARB	RTI
T09-13043	47-mm Teflon®	05/14/09	152-hour event	CARB	RTI
T09-13056	47-mm Teflon®	blank	-----	CARB	RTI
T09-13057	47-mm Teflon®	blank	-----	CARB	RTI
T09-13028	47-mm Teflon®	02/25/09	168-hour event	DRI	RTI
T09-13029	47-mm Teflon®	02/25/09	168-hour event	DRI	RTI
T09-13044	47-mm Teflon®	05/14/09	152-hour event	DRI	RTI
T09-13045	47-mm Teflon®	05/14/09	152-hour event	DRI	RTI
T09-13058	47-mm Teflon®	blank	-----	DRI	RTI
T09-13059	47-mm Teflon®	blank	-----	DRI	RTI
T09-13030	47-mm Teflon®	02/25/09	168-hour event	ODEQ	RTI
T09-13031	47-mm Teflon®	02/25/09	168-hour event	ODEQ	RTI
T09-13046	47-mm Teflon®	05/14/09	152-hour event	ODEQ	RTI
T09-13047	47-mm Teflon®	05/14/09	152-hour event	ODEQ	RTI
T09-13060	47-mm Teflon®	blank	-----	ODEQ	RTI
T09-13061	47-mm Teflon®	blank	-----	ODEQ	RTI
T09-13032	47-mm Teflon®	02/25/09	168-hour event	AQMD	RTI
T09-13033	47-mm Teflon®	02/25/09	168-hour event	AQMD	RTI
T09-13048	47-mm Teflon®	05/14/09	152-hour event	AQMD	RTI
T09-13049	47-mm Teflon®	05/14/09	152-hour event	AQMD	RTI
T09-13062	47-mm Teflon®	blank	-----	AQMD	RTI
T09-13063	47-mm Teflon®	blank	-----	AQMD	RTI
T09-13034	47-mm Teflon®	02/25/09	168-hour event	UCD	RTI
T09-13035	47-mm Teflon®	02/25/09	168-hour event	UCD	RTI
T09-13050	47-mm Teflon®	05/14/09	152-hour event	UCD	RTI
T09-13051	47-mm Teflon®	05/14/09	152-hour event	UCD	RTI
T09-13064	47-mm Teflon®	blank	-----	UCD	RTI
T09-13065	47-mm Teflon®	blank	-----	UCD	RTI
T09-13022	25-mm Teflon®	02/25/09	168-hour event	DRI	UCD
T09-13023	25-mm Teflon®	02/25/09	168-hour event	DRI	UCD
T09-13037	25-mm Teflon®	05/14/09	152-hour event	DRI	UCD
T09-13038	25-mm Teflon®	05/14/09	152-hour event	DRI	UCD
T09-13052	25-mm Teflon®	blank	-----	DRI	UCD
T09-13053	25-mm Teflon®	blank	-----	DRI	UCD
T09-13024	25-mm Teflon®	02/25/09	168-hour event	RTI	UCD
T09-13025	25-mm Teflon®	02/25/09	168-hour event	RTI	UCD

Table 7. Sampling Schedule for XRF PT Filters

Filter ID	Filter Size	Sample Start	Event Duration	Test Lab	Reference Lab
T09-13039	25-mm Teflon®	05/14/09	152-hour event	RTI	UCD
T09-13040	25-mm Teflon®	05/14/09	152-hour event	RTI	UCD
T09-13054	25-mm Teflon®	blank	-----	RTI	UCD
T09-13055	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
168-hr event starting on 02/25/09	25-mm	T09-13022	DRI	UCD	760	763.8	-0.5%
		T09-13023	DRI	UCD	762	763.8	-0.2%
		T09-13024	RTI	UCD	767	763.8	0.4%
		T09-13025	RTI	UCD	766	763.8	0.3%
	47-mm	T09-13026	CARB	RTI	742	740.2	0.2%
		T09-13027	CARB	RTI	729	740.2	-1.5%
		T09-13028	DRI	RTI	738	740.2	-0.3%
		T09-13029	DRI	RTI	736	740.2	-0.6%
		T09-13030	ODEQ	RTI	739	740.2	-0.2%
		T09-13031	ODEQ	RTI	741	740.2	0.1%
		T09-13032	AQMD	RTI	735	740.2	-0.7%
		T09-13033	AQMD	RTI	740	740.2	0.0%
		T09-13034	UCD	RTI	756	740.2	2.1%
		T09-13035	UCD	RTI	746	740.2	0.8%
152-hr event starting on 5/14/09	25-mm	T09-13037	DRI	UCD	418	422.8	-1.1%
		T09-13038	DRI	UCD	423	422.8	0.1%
		T09-13039	RTI	UCD	432	422.8	2.2%
		T09-13040	RTI	UCD	418	422.8	-1.1%
	47-mm	T09-13042	CARB	RTI	444	437.8	1.4%
		T09-13043	CARB	RTI	428	437.8	-2.2%
		T09-13044	DRI	RTI	433	437.8	-1.1%
		T09-13045	DRI	RTI	431	437.8	-1.6%
		T09-13046	ODEQ	RTI	445	437.8	1.6%
		T09-13047	ODEQ	RTI	435	437.8	-0.6%
		T09-13048	AQMD	RTI	441	437.8	0.7%
		T09-13049	AQMD	RTI	432	437.8	-1.3%
		T09-13050	UCD	RTI	448	437.8	2.3%
		T09-13051	UCD	RTI	441	437.8	0.7%

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. µg/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 and AQMD used 11.6 cm^2 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 3.44 cm^2. 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).

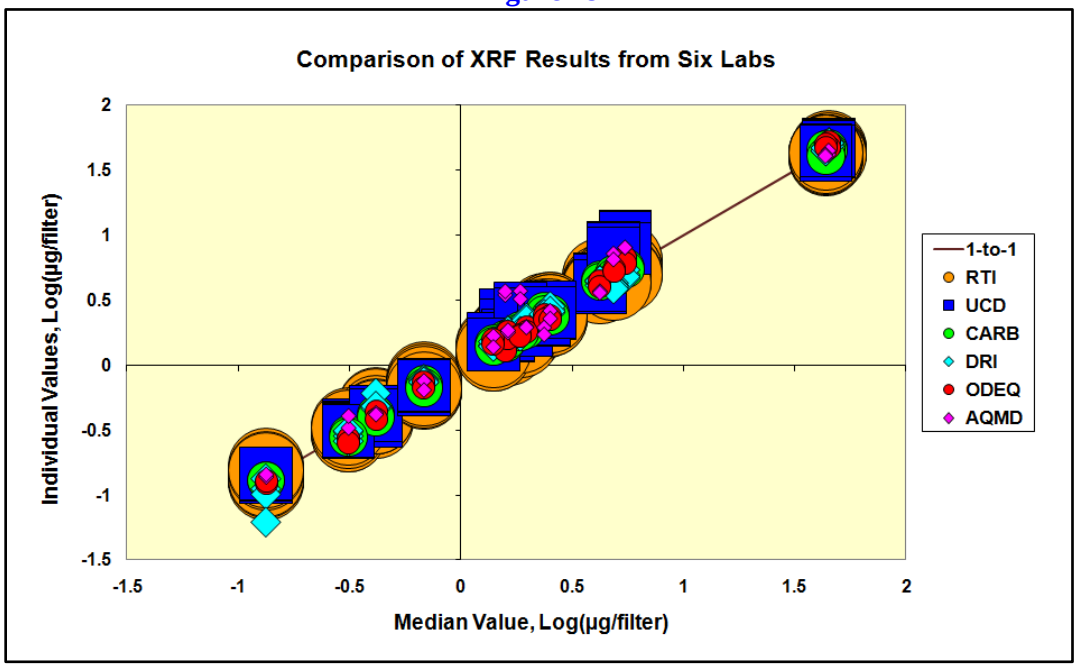
XRF Results

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 18. 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 18 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 18



The more significant results are presented again as stacked-bar graphs in figures 19 and 20. 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. The most noticeable results in figures 19 and 20 are the aluminum values reported by AQMD.

Figure 19

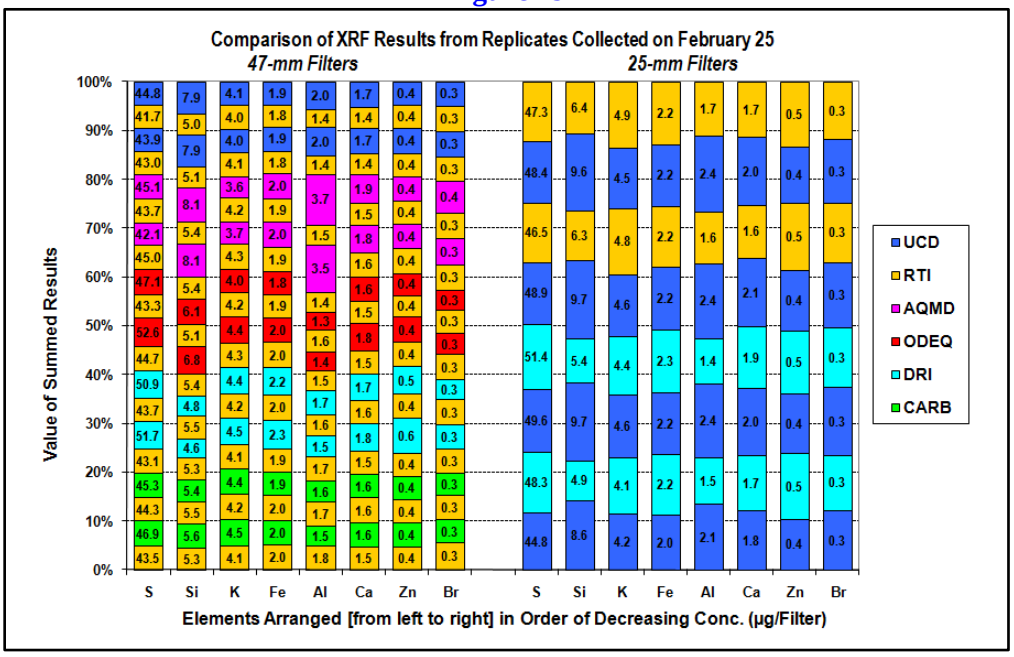
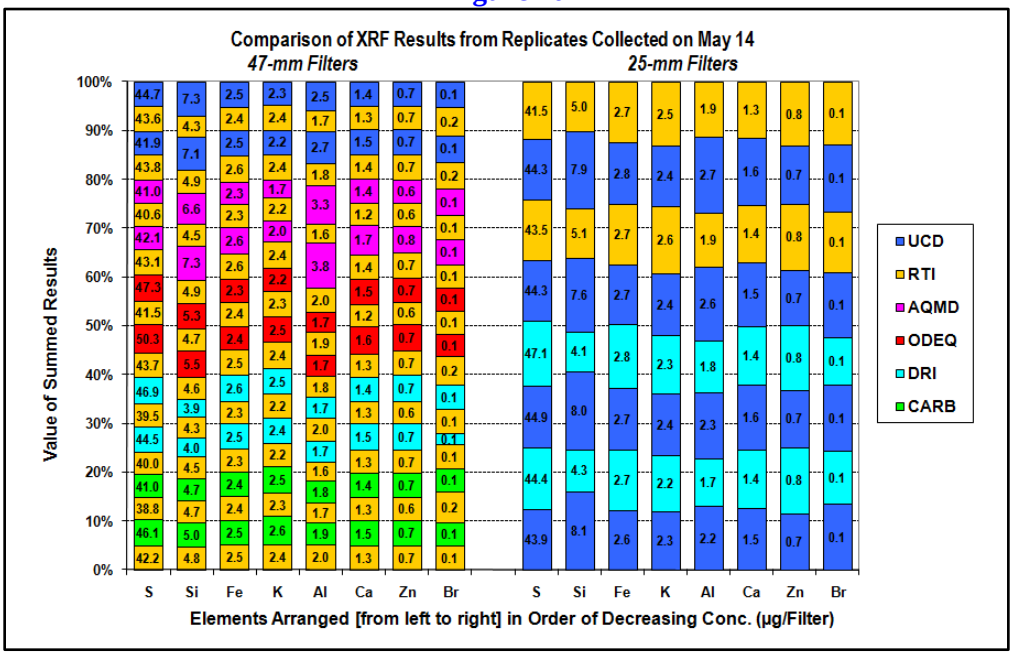


Figure 20



The normalized stacked-bar graphs presented in figures 19 and 20 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 21 through 31 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 18 through 20. 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 21 through 31 that the result from the reference lab is always presented immediately to the left of the test lab result.

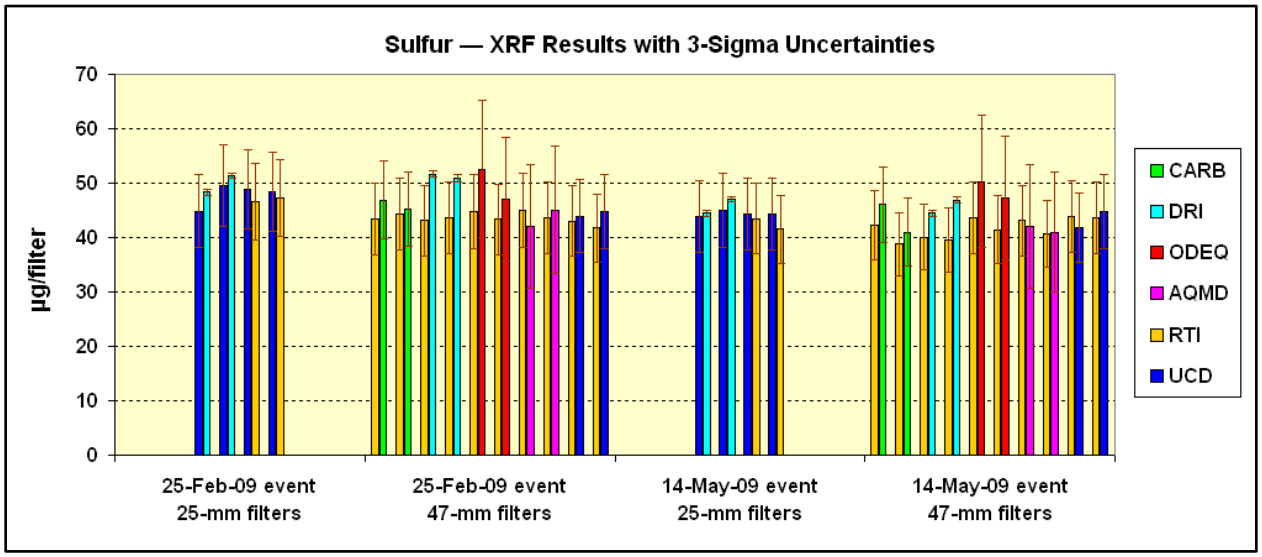


Figure 21

Results for sulfur are presented in figure 21. It was the most abundant element reported by all of the labs, and sulfur is a large peak in the analytical spectrum. It is interesting to note that sulfur is present at about the same level on all of the filters regardless of sampling date or filter size. Yet according to table 8, filters from the February 25 sampling event captured almost twice as much $PM_{2.5}$ as the filters from the May 14 event. Figure 21 shows reasonably good agreement among all of the labs for the sulfur concentration. There is less agreement for the uncertainty estimates, however. DRI reported noticeably smaller uncertainties than the other labs.

Figure 22 shows results from silicon, and some discrepancies are observed. For example, silicon results from UCD and AQMD are consistently higher than results from the other labs. Good agreement was observed from all labs for potassium, iron, and calcium shown in figures 23, 24, and 25 respectively. The uncertainties reported by DRI continue to be smaller than the other labs.

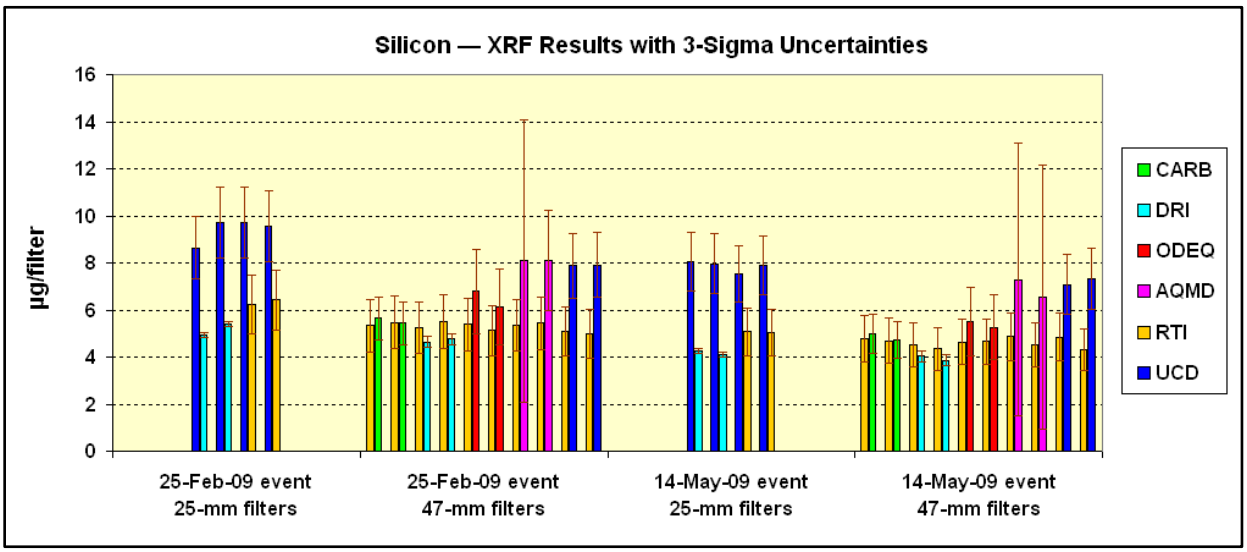


Figure 22

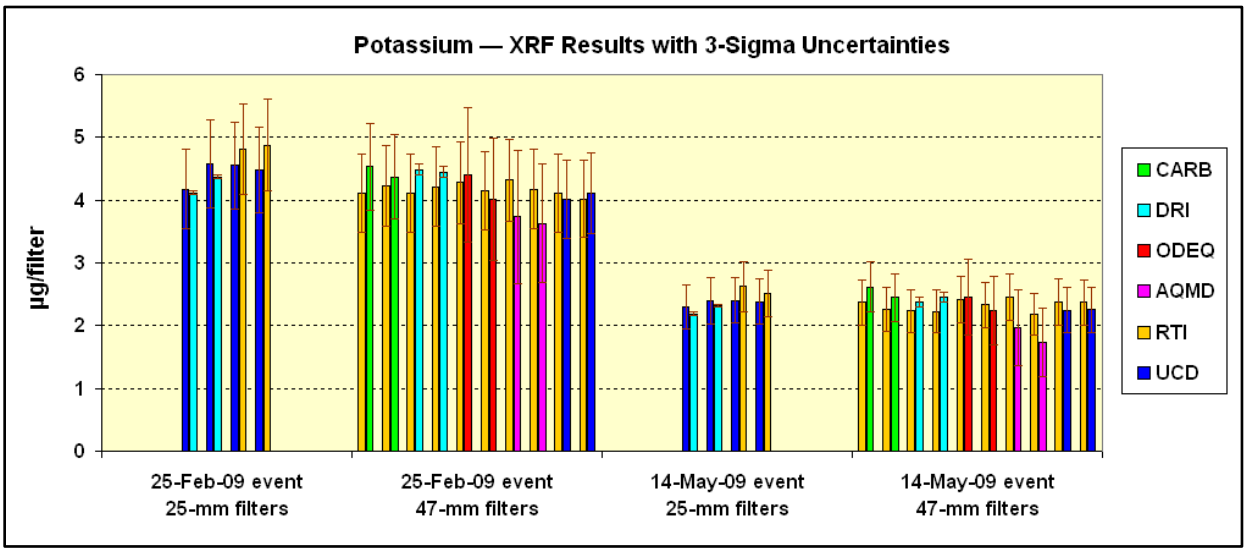


Figure 23

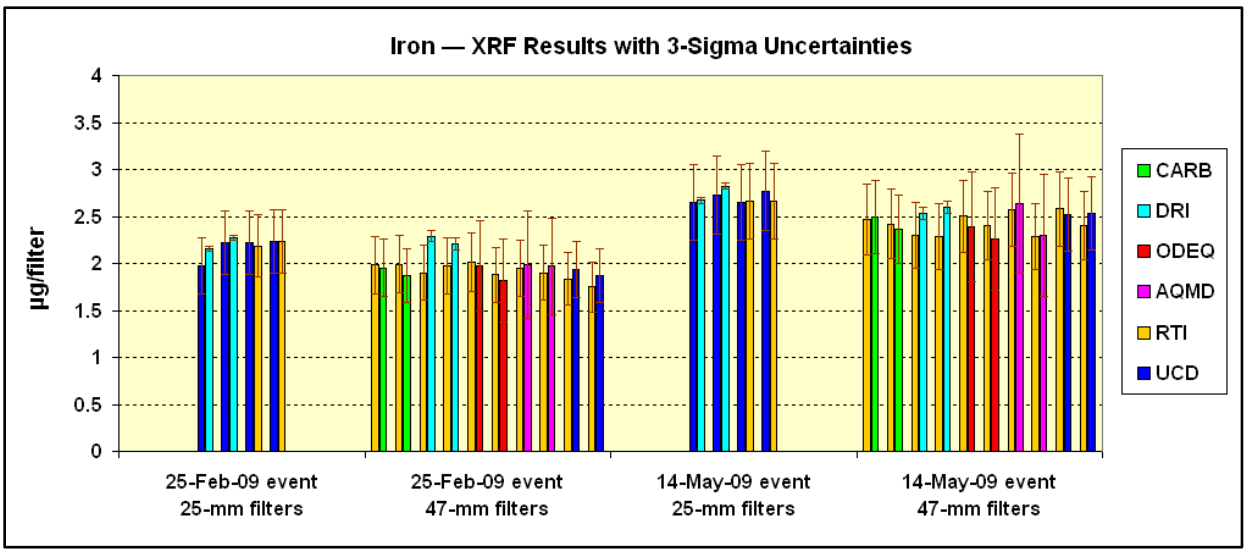


Figure 24

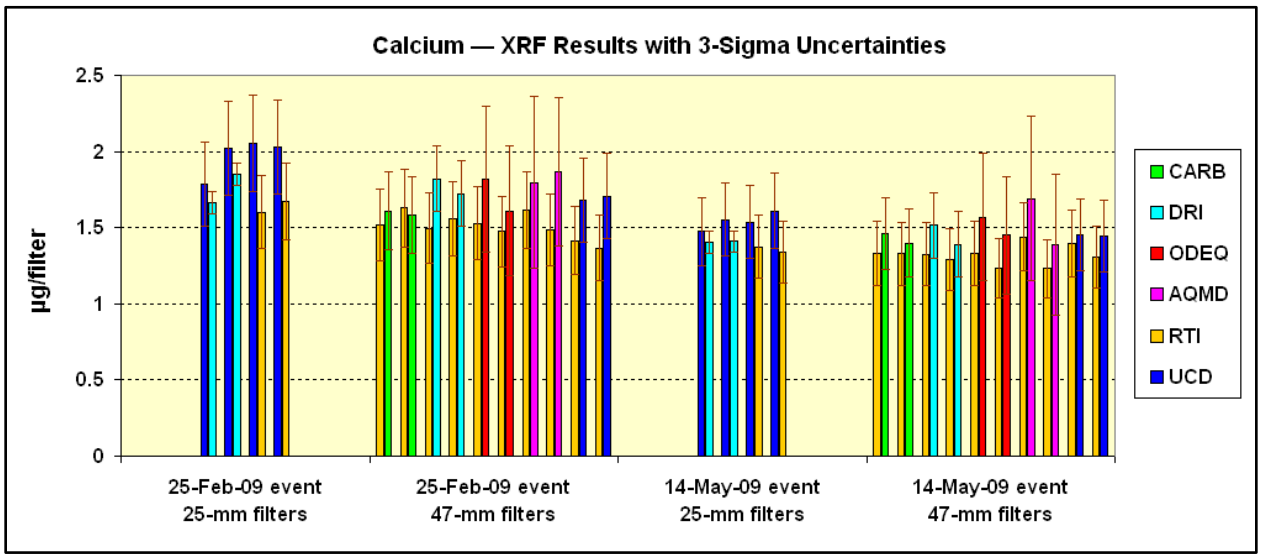


Figure 25

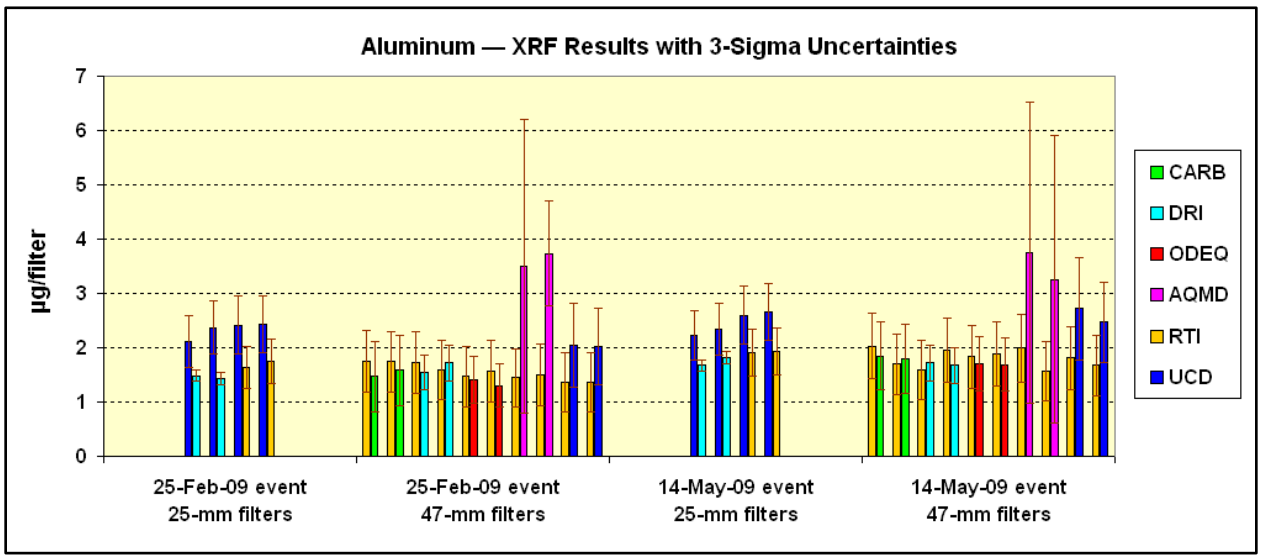


Figure 26

Stacked bar graphs were used earlier in this report to present results from several elements at the same time (see figures 19 and 20). It was easy to see in those earlier graphs that the aluminum results from AQMD were larger than the aluminum results from other labs, but here in figure 26, it is possible to see that the uncertainties reported by AQMD are also high. Figure 26 is perhaps a stronger visual presentation of the aluminum results. This graph clearly shows that UCD results were also relatively high.

Fairly good agreement was observed from all labs for the zinc and bromine concentrations reported in figures 27 and 28 respectively. These are the last two elements having a significant concentration reported by every laboratory. All of the remaining graphs in figures 29 through 31 will contain some results that are smaller than three times the reported uncertainty. Those results are easily identified in the graph because the uncertainty range will extend below the zero concentration level. For example, three of the titanium results in figure 29 were smaller than three times the uncertainty. Two values reported with low confidence were from ODEQ, and one was from RTI.

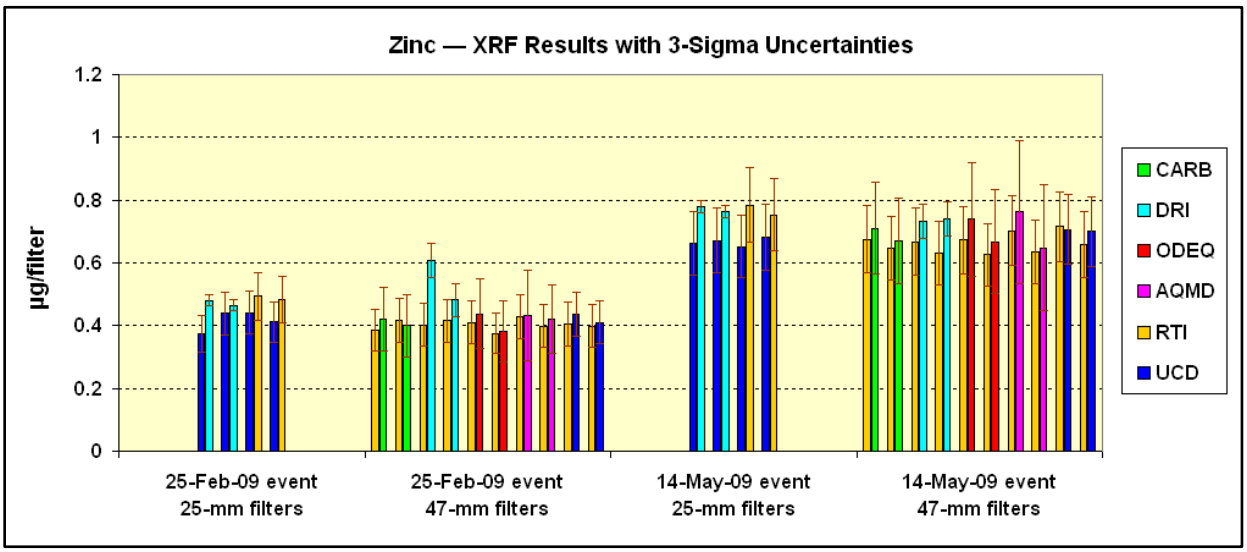


Figure 27

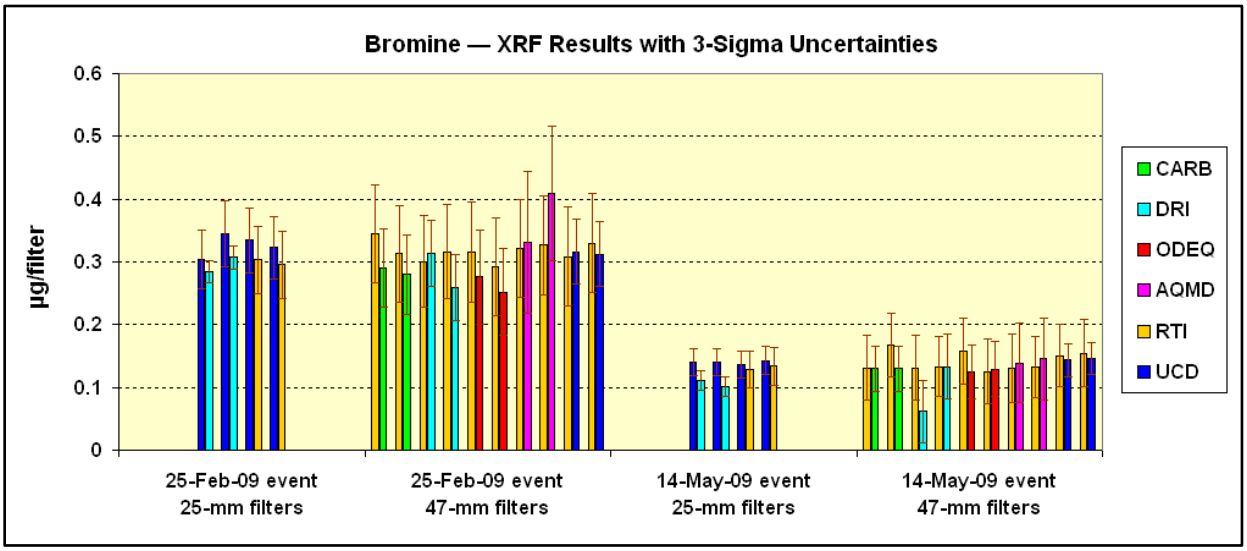


Figure 28

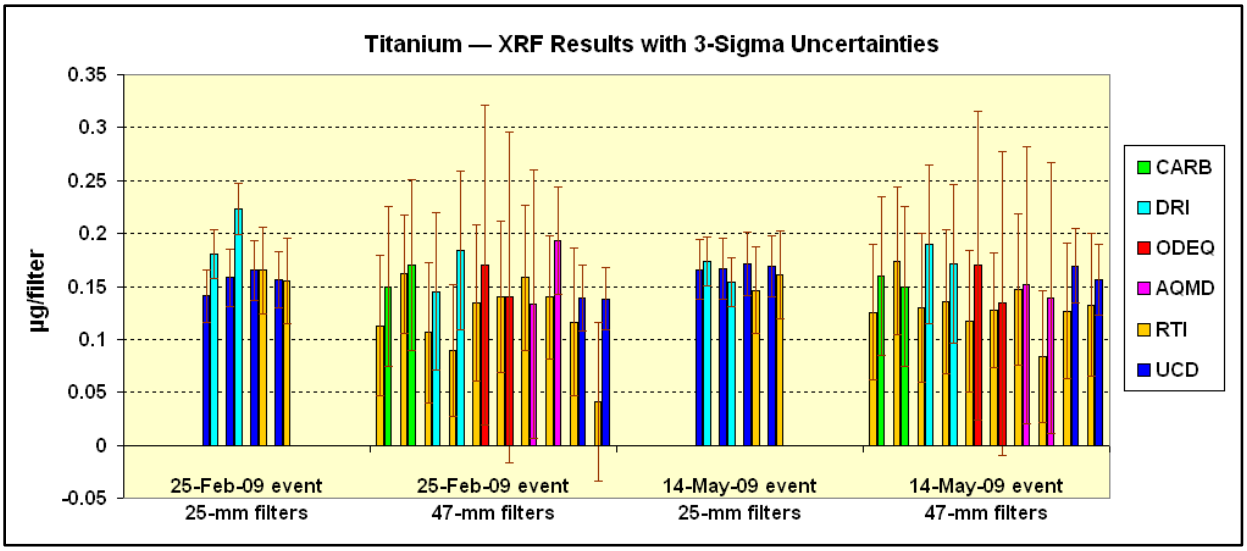


Figure 29

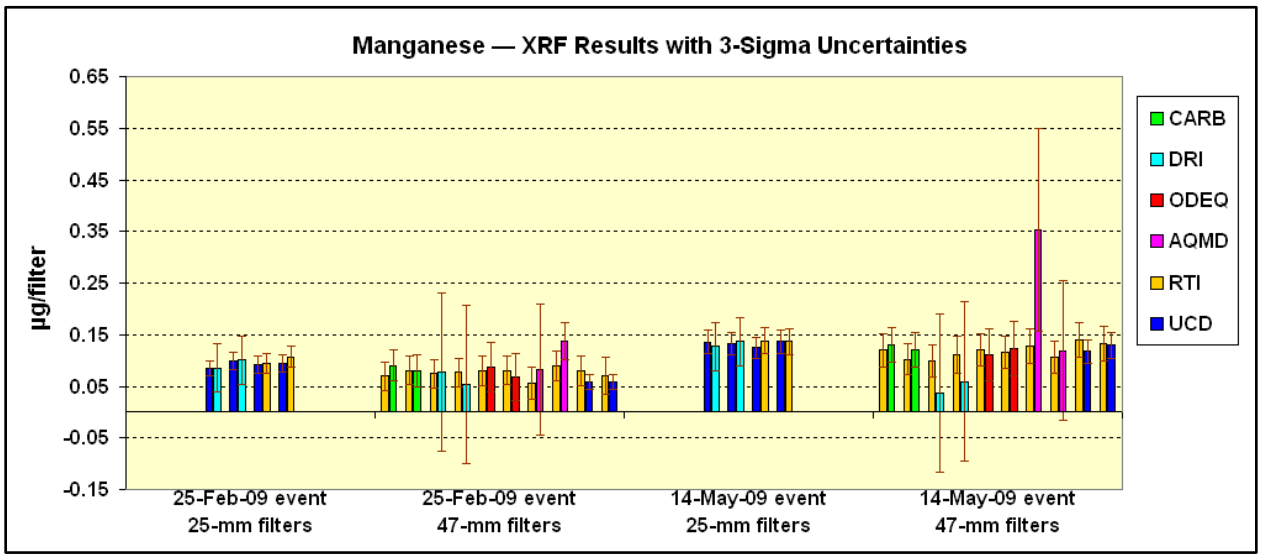


Figure 30

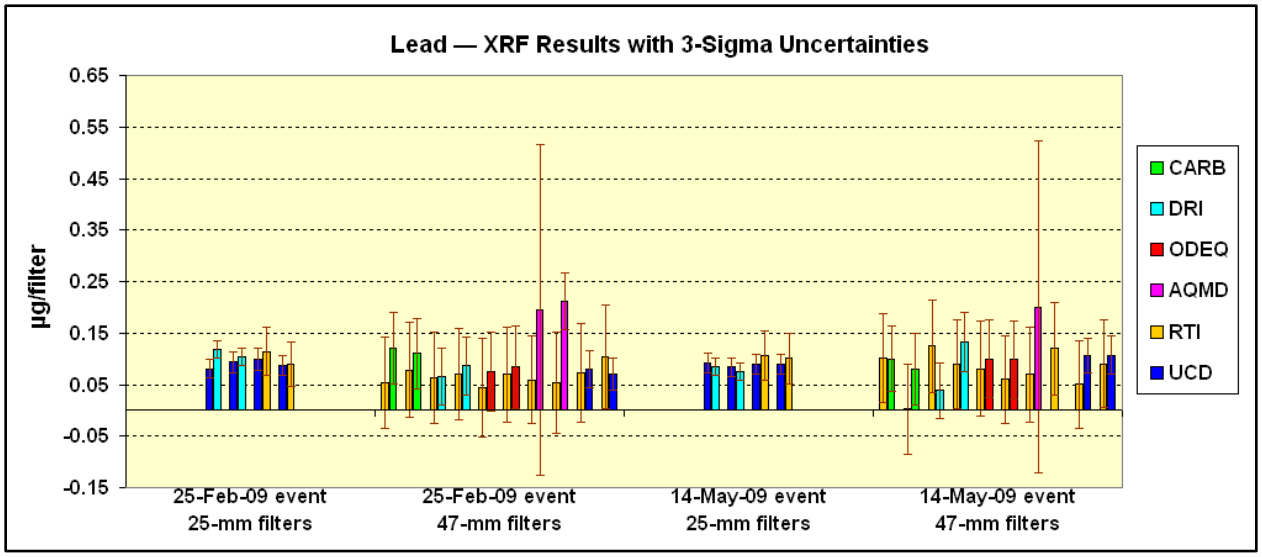


Figure 31

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 February 25 replicates was 2.894 µg/filter, and the mean uncertainty for the same set of results was 0.165 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 Feb 25 Replicates Analyzed	12	6	2	4	2	2
Mean	2.894	3.209	3.927	3.196	5.539	4.815
Max	47.264	49.550	46.920	51.657	52.600	45.091
Min	0.0000	0.0000	0.0200	0.0000	0.0270	0.0528
Std. Dev.	9.366	10.002	11.181	10.751	13.809	11.399
Count	252	126	32	84	24	27
Number of May 14 Replicates Analyzed	12	6	2	4	2	2
Mean	2.672	2.954	3.538	2.827	6.020	4.941
Max	43.788	44.946	46.090	47.058	50.300	42.097
Min	0.0000	0.0000	0.0200	0.0000	0.0980	0.0408
Std. Dev.	8.857	9.384	10.425	9.713	14.314	11.445
Count	252	126	33	84	21	24
Number of Blank Filters Analyzed	12	6	2	4	2	2
Mean	0.001	0.015	-----	0.007	-----	0.078
Max	0.084	0.462	-----	0.308	-----	0.197
Min	0.0000	0.0000	-----	0.0000	-----	0.0240
Std. Dev.	0.006	0.060	-----	0.034	-----	0.072
Count	252	126	0	84	0	5

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

	RTI	UCD	CARB	DRI	ODEQ	AQMD
Number of Feb 25 Replicates Analyzed	12	6	2	4	2	2
Mean	0.165	0.168	0.217	0.031	0.291	0.534
Max	2.367	2.484	2.354	0.194	4.231	3.905
Min	0.0022	0.0000	0.0090	0.0049	0.0077	0.0056
Std. Dev.	0.468	0.503	0.557	0.041	0.855	1.044
Count	252	126	32	84	42	27
Number of May 14 Replicates Analyzed	12	6	2	4	2	2
Mean	0.152	0.155	0.198	0.029	0.278	0.619
Max	2.198	2.255	2.312	0.176	4.044	3.771
Min	0.0023	0.0000	0.0070	0.0049	0.0075	0.0123
Std. Dev.	0.443	0.472	0.519	0.038	0.835	1.097
Count	252	126	33	84	42	24
Number of Blank Filters Analyzed	12	6	2	4	2	2
Mean	0.013	0.005	-----	0.020	0.022	0.024
Max	0.099	0.157	-----	0.103	0.059	0.052
Min	0.0012	0.0000	-----	0.0049	0.0068	0.0120
Std. Dev.	0.017	0.020	-----	0.021	0.016	0.017
Count	252	126	0	84	42	5

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 February 25 replicates (i.e. 52.60 ±4.23 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 18 through 20.

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 2008 (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.

Five 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. The potassium results reported by ODEQ were consistently higher than the other labs by approximately a factor of two. This problem was investigated at ODEQ by examining the raw data. Potassium was observed in the chromatograms as a small "rider peak" that was not adequately resolved from a large "tailing" ammonium peak. ODEQ concluded that peak skimming should have been used to more accurately assess the peak area of potassium. The potassium results from AQMD were somewhat low compared to other labs, but potassium was present on the exposed filters at a very low level. No other problems were observed in the IC results from this study.

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 TOA method. With the exception of CARB, all of the labs reported results from more than one instrument. A total of twelve 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. The results from this study are useful to evaluate performance at several different levels. Precision can be evaluated within one lab and among different labs. Two different methods were reported, and results were reported from three different models of instrumentation. Care must be exercised to make valid comparisons! Extra text was included in this report to help support and explain the comparisons that have been made.

Precision is normally very good for the total carbon (TC) when results are compared among labs, among methods, and even among instruments. However, a few troublesome TC values were reported for this study. The four highest TC values were reported by AQMD. Consistently high values were also reported from RTI's instrument #1. The lowest TC values for both the IMPROVE_A and also the CSN methods were reported by DRI, but they were still in agreement with others within reported uncertainties.

Carbon fractions are affected by the choice of method. For example, EC values reported from the CSN/TOT method were less than half the EC values reported from the IMPROVE_A/TOR method regardless of lab and model of instrumentation. Results from this study show reasonably good precision within the same method for the major carbon fractions, OC and EC, regardless of which instrument performed the analysis. The smaller carbon fractions, such as OC1, EC1, and PyrolC, are referred to as subfractions in this report. As expected, some of the subfractions show the worst precision even within the same method and within the same model of instrument.

This is the second study supported by NAREL that includes both 25-mm and 47-mm filters for XRF analysis. By sampling and analyzing two different filter media, a new level of investigation was 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)		
T09-13066	48-hr event 11/30/09	144.196	144.192	144.321	144.325	0.125	0.133	0.008	CARB
T09-13067	48-hr event 11/30/09	145.572	145.568	145.690	145.692	0.118	0.124	0.006	CARB
T09-13068	24-hr event 12/02/09	144.074	144.070	144.123	144.126	0.049	0.056	0.007	CARB
T09-13069	24-hr event 12/02/09	142.043	142.039	142.087	142.088	0.044	0.049	0.005	CARB
T09-13070	24-hr event 12/02/09	145.270	145.269	145.315	145.318	0.045	0.049	0.004	CARB
T09-13071	22-hr event 12/03/09	144.964	144.961	145.090	145.095	0.126	0.134	0.008	CARB
T09-13072	22-hr event 12/03/09	144.469	144.467	144.592	144.598	0.123	0.131	0.008	CARB
T09-13073	blank	144.386	144.385	144.387	144.387	0.001	0.002	0.001	CARB
T09-13074	blank	143.965	143.962	143.965	143.965	0.000	0.003	0.003	CARB
T09-13075	blank	141.907	141.902	141.903	141.904	-0.004	0.002	0.006	CARB
MW09-13126	metallic transfer weight	173.347	173.344	173.345	173.344	-0.002	0.000	0.002	CARB
MW09-13127	metallic transfer weight	95.853	95.851	95.853	95.851	0.000	0.000	0.000	CARB
T09-13076	48-hr event 11/30/09	145.368	145.347	145.486	145.476	0.118	0.129	0.011	DRI
T09-13077	48-hr event 11/30/09	142.397	142.375	142.524	142.510	0.127	0.135	0.008	DRI
T09-13078	24-hr event 12/02/09	148.071	148.052	148.120	148.104	0.049	0.052	0.003	DRI
T09-13079	24-hr event 12/02/09	145.063	145.043	145.113	145.094	0.050	0.051	0.001	DRI
T09-13080	24-hr event 12/02/09	142.948	142.926	142.994	142.976	0.046	0.050	0.004	DRI
T09-13081	22-hr event 12/03/09	144.498	144.482	144.619	144.609	0.121	0.127	0.006	DRI
T09-13082	22-hr event 12/03/09	143.217	143.197	143.339	143.329	0.122	0.132	0.010	DRI
T09-13083	blank	144.138	144.119	144.139	144.120	0.001	0.001	0.000	DRI
T09-13084	blank	146.977	146.955	146.978	146.957	0.001	0.002	0.001	DRI
T09-13085	blank	144.648	144.631	144.651	144.631	0.003	0.000	-0.003	DRI
MW09-13128	metallic transfer weight	171.470	171.476	171.469	171.476	-0.001	0.000	0.001	DRI
MW09-13129	metallic transfer weight	99.712	99.715	99.712	99.715	0.000	0.000	0.000	DRI
T09-13086	48-hr event 11/30/09	144.967	144.968	145.089	145.095	0.122	0.127	0.005	ODEQ
T09-13087	48-hr event 11/30/09	144.918	144.919	145.036	145.043	0.118	0.124	0.006	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)		
T09-13088	24-hr event 12/02/09	145.354	145.355	145.395	145.399	0.041	0.044	0.003	ODEQ
T09-13089	24-hr event 12/02/09	145.248	145.252	145.299	145.304	0.051	0.052	0.001	ODEQ
T09-13090	24-hr event 12/02/09	148.361	148.363	148.407	148.413	0.046	0.050	0.004	ODEQ
T09-13091	22-hr event 12/03/09	144.651	144.653	144.774	144.779	0.123	0.126	0.003	ODEQ
T09-13092	22-hr event 12/03/09	145.487	145.489	145.614	145.620	0.127	0.131	0.004	ODEQ
T09-13093	blank	146.164	146.167	146.164	146.168	0.000	0.001	0.001	ODEQ
T09-13094	blank	147.475	147.476	147.474	147.478	-0.001	0.002	0.003	ODEQ
T09-13095	blank	145.418	145.419	145.417	145.420	-0.001	0.001	0.002	ODEQ
MW09-13130	metallic transfer weight	190.083	190.084	190.082	190.084	-0.001	0.000	0.001	ODEQ
MW09-13131	metallic transfer weight	87.549	87.550	87.549	87.550	0.000	0.000	0.000	ODEQ
T09-13096	48-hr event 11/30/09	147.557	147.556	147.678	147.686	0.121	0.130	0.009	RTI
T09-13097	48-hr event 11/30/09	146.936	146.936	147.057	147.064	0.121	0.128	0.007	RTI
T09-13098	24-hr event 12/02/09	146.056	146.057	146.103	146.108	0.047	0.051	0.004	RTI
T09-13099	24-hr event 12/02/09	147.079	147.079	147.129	147.133	0.050	0.054	0.004	RTI
T09-13100	24-hr event 12/02/09	144.198	144.201	144.247	144.251	0.049	0.050	0.001	RTI
T09-13101	22-hr event 12/03/09	146.395	146.397	146.518	146.526	0.123	0.129	0.006	RTI
T09-13102	22-hr event 12/03/09	146.808	146.811	146.936	146.942	0.128	0.131	0.003	RTI
T09-13103	blank	144.802	144.804	144.802	144.806	0.000	0.002	0.002	RTI
T09-13104	blank	144.989	144.991	144.990	144.993	0.001	0.002	0.001	RTI
T09-13105	blank	147.819	147.821	147.819	147.822	0.000	0.001	0.001	RTI
MW09-13132	metallic transfer weight	181.333	181.334	181.334	181.334	0.001	0.000	-0.001	RTI
MW09-13133	metallic transfer weight	93.775	93.776	93.775	93.776	0.000	0.000	0.000	RTI
T09-13106	48-hr event 11/30/09	144.355	144.353	144.476	144.478	0.121	0.125	0.004	AQMD
T09-13107	48-hr event 11/30/09	143.145	143.142	143.267	143.270	0.122	0.128	0.006	AQMD
T09-13108	24-hr event 12/02/09	145.664	145.660	145.716	145.717	0.052	0.057	0.005	AQMD
T09-13109	24-hr event 12/02/09	145.549	145.547	145.602	145.603	0.053	0.056	0.003	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)		
T09-13110	24-hr event 12/02/09	144.851	144.847	144.897	144.900	0.046	0.053	0.007	AQMD
T09-13111	22-hr event 12/03/09	145.452	145.450	145.583	145.586	0.131	0.136	0.005	AQMD
T09-13112	22-hr event 12/03/09	142.375	142.375	142.501	142.504	0.126	0.129	0.003	AQMD
T09-13113	blank	143.103	143.101	143.103	143.106	0.000	0.005	0.005	AQMD
T09-13114	blank	145.892	145.891	145.893	145.895	0.001	0.004	0.003	AQMD
T09-13115	blank	148.504	148.503	148.507	148.506	0.003	0.003	0.000	AQMD
MW09-13134	metallic transfer weight	193.822	193.822	193.821	193.822	-0.001	0.000	0.001	AQMD
MW09-13135	metallic transfer weight	92.960	92.959	92.959	92.959	-0.001	0.000	0.001	AQMD

**** 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
N08-12313	Nylon®	152-hr Event 01/23/08	CARB	CSN	-----	98.63	-----	137.03	79.83	3.06	3.88
N09-12915	Nylon®	128-hr Event 01/07/09	CARB	CSN	-----	48.96	-----	119.93	60.53	2.72	1.85
N09-12916	Nylon®	128-hr Event 01/07/09	CARB	CSN	-----	48.84	-----	119.58	59.67	2.67	1.84
N09-12917	Nylon®	128-hr Event 01/07/09	DRI	CSN	-----	48.87	-----	122.42	51.07	1.96	1.76
N09-12918	Nylon®	128-hr Event 01/07/09	DRI	CSN	-----	49.40	-----	123.08	51.17	2.73	1.91
N09-12919	Nylon®	128-hr Event 01/07/09	ODEQ	CSN	-----	44.00	-----	107.00	35.20	5.02	<3.6
N09-12920	Nylon®	128-hr Event 01/07/09	ODEQ	CSN	-----	45.00	-----	109.00	36.60	5.00	<3.6
N09-12921	Nylon®	128-hr Event 01/07/09	RTI	CSN	-----	49.37	-----	122.52	50.10	2.38	1.80
N09-12922	Nylon®	128-hr Event 01/07/09	RTI	CSN	-----	49.17	-----	123.78	50.48	2.38	1.88
N09-12923	Nylon®	128-hr Event 01/07/09	AQMD	CSN	-----	47.40	-----	123.30	49.80	1.80	2.10
N09-12924	Nylon®	128-hr Event 01/07/09	AQMD	CSN	-----	46.80	-----	121.80	49.80	1.80	1.80
N09-12925	Nylon®	128-hr Event 01/07/09	NAREL	CSN	-----	51.55	-----	120.79	50.93	2.67	1.80
N09-12926	Nylon®	128-hr Event 01/07/09	NAREL	CSN	-----	49.75	-----	118.64	49.51	2.70	1.73
N09-12927	Nylon®	176-hr Event 03/30/09	CARB	CSN	-----	34.82	-----	152.46	65.07	2.81	2.49
N09-12928	Nylon®	176-hr Event 03/30/09	CARB	CSN	-----	36.04	-----	153.04	65.36	2.81	2.46
N09-12929	Nylon®	176-hr Event 03/30/09	DRI	CSN	-----	34.65	-----	149.84	54.39	2.67	2.31
N09-12930	Nylon®	176-hr Event 03/30/09	DRI	CSN	-----	32.19	-----	150.46	53.18	2.69	2.29
N09-12931	Nylon®	176-hr Event 03/30/09	ODEQ	CSN	-----	36.10	-----	157.00	45.90	6.17	<3.6
N09-12932	Nylon®	176-hr Event 03/30/09	ODEQ	CSN	-----	34.40	-----	152.00	43.90	5.63	<3.6
N09-12933	Nylon®	176-hr Event 03/30/09	RTI	CSN	-----	35.40	-----	151.32	53.09	2.36	2.49
N09-12934	Nylon®	176-hr Event 03/30/09	RTI	CSN	-----	32.83	-----	150.99	51.97	2.39	2.46
N09-12935	Nylon®	176-hr Event 03/30/09	AQMD	CSN	-----	34.50	-----	149.40	52.80	1.50	2.40
N09-12936	Nylon®	176-hr Event 03/30/09	AQMD	CSN	-----	32.10	-----	149.10	51.60	1.50	2.40
N09-12937	Nylon®	176-hr Event 03/30/09	NAREL	CSN	-----	33.86	-----	145.16	51.25	2.56	2.25
N09-12938	Nylon®	176-hr Event 03/30/09	NAREL	CSN	-----	34.22	-----	147.17	52.20	2.77	2.36
N09-12941	Nylon®	136-hr Event 2/13/09	RTI	IMPROVE	7.86	66.98	0.92	181.26	76.73	-----	-----
N09-12942	Nylon®	136-hr Event 2/13/09	RTI	IMPROVE	7.36	67.61	1.00	179.50	76.16	-----	-----
N09-12943	Nylon®	136-hr Event 2/13/09	NAREL	IMPROVE	6.75	65.03	0.52	174.61	73.77	-----	-----
N09-12944	Nylon®	136-hr Event 2/13/09	NAREL	IMPROVE	6.60	64.54	1.11	170.39	70.35	-----	-----
N09-12953	Nylon®	144-hr Event 3/17/09	RTI	IMPROVE	5.63	48.52	1.01	163.81	59.49	-----	-----
N09-12954	Nylon®	144-hr Event 3/17/09	RTI	IMPROVE	6.08	50.37	1.09	161.38	59.71	-----	-----

Table 11. Ion Chromatography PT Results

Sample ID	Filter Medium	Sample Description	Lab	Method	Concentration (µg/filter)						
					Chloride	Nitrate	Nitrite	Sulfate	Ammonium	Potassium	Sodium
N09-12955	Nylon®	144-hr Event 3/17/09	NAREL	IMPROVE	5.82	48.66	0.52	154.06	56.75	-----	-----
N09-12956	Nylon®	144-hr Event 3/17/09	NAREL	IMPROVE	5.38	47.33	0.88	152.82	56.82	-----	-----
N09-12965	Nylon®	filter blank	CARB	CSN	-----	<0.5	-----	<1.75	<0.5	<1.25	<0.75
N09-12966	Nylon®	filter blank	CARB	CSN	-----	<0.5	-----	<1.75	<0.5	<1.25	<0.75
N09-12967	Nylon®	filter blank	DRI	CSN	-----	0.11	-----	0.00	0.03	0.00	0.16
N09-12968	Nylon®	filter blank	DRI	CSN	-----	0.26	-----	0.07	0.02	0.00	0.16
N09-12969	Nylon®	filter blank	ODEQ	CSN	-----	<1.4	-----	<1.4	<0.72	<1.1	<3.6
N09-12970	Nylon®	filter blank	ODEQ	CSN	-----	<1.4	-----	<1.4	<0.72	<1.1	<3.6
N09-12971	Nylon®	filter blank	RTI	CSN	-----	0.09	-----	0.20	0.00	0.00	0.22
N09-12972	Nylon®	filter blank	RTI	CSN	-----	0.43	-----	0.66	0.00	0.00	0.17
N09-12973	Nylon®	filter blank	AQMD	CSN	-----	1.80	-----	ND	ND	ND	ND
N09-12974	Nylon®	filter blank	AQMD	CSN	-----	1.50	-----	ND	ND	ND	ND
N09-12975	Nylon®	filter blank	NAREL	CSN	-----	0.25	-----	<1	<1	<0.5	<0.5
N09-12976	Nylon®	filter blank	NAREL	CSN	-----	<1	-----	<1	<1	<0.5	<0.5
N09-12977	Nylon®	filter blank	RTI	IMPROVE	0.15	0.23	0.75	0.38	0.00	-----	-----
N09-12978	Nylon®	filter blank	RTI	IMPROVE	0.13	0.14	0.60	0.42	0.00	-----	-----
N09-12979	Nylon®	filter blank	NAREL	IMPROVE	<0.5	<1	0.25	<1	<1	-----	-----
N09-12980	Nylon®	filter blank	NAREL	IMPROVE	<0.5	<1	0.24	<1	<1	-----	-----
T09-12947	Teflon®	136-hr Event 2/13/09	DRI	CSN	-----	7.58	-----	168.75	63.35	2.88	4.26
T09-12948	Teflon®	136-hr Event 2/13/09	DRI	CSN	-----	8.02	-----	178.57	68.55	2.65	4.47
T09-12949	Teflon®	136-hr Event 2/13/09	NAREL	CSN	-----	8.08	-----	165.82	61.62	2.90	4.20
T09-12950	Teflon®	136-hr Event 2/13/09	NAREL	CSN	-----	7.08	-----	164.76	61.25	3.15	4.33
T09-12959	Teflon®	144-hr Event 3/17/09	DRI	CSN	-----	5.21	-----	154.88	57.16	3.08	2.73
T09-12960	Teflon®	144-hr Event 3/17/09	DRI	CSN	-----	5.15	-----	152.51	56.51	2.89	2.76
T09-12961	Teflon®	144-hr Event 3/17/09	NAREL	CSN	-----	5.41	-----	148.11	55.07	3.26	2.67
T09-12962	Teflon®	144-hr Event 3/17/09	NAREL	CSN	-----	5.41	-----	144.74	53.93	2.93	2.82
T09-12981	Teflon®	filter blank	DRI	CSN	-----	0.00	-----	0.09	0.03	0.55	0.25
T09-12982	Teflon®	filter blank	DRI	CSN	-----	0.00	-----	0.00	0.03	0.00	0.21
T09-12983	Teflon®	filter blank	NAREL	CSN	-----	0.72	-----	<1	-0.14	<0.5	0.16
T09-12984	Teflon®	filter blank	NAREL	CSN	-----	0.87	-----	<1	0.01	<0.5	0.21

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
Q09-12985	160-hr Event 01/29/09	CARB	1	IMPROVE_A	15.8	4.3	20.0	<0.8	3.6	5.4	3.0	3.6
Q09-12986	160-hr Event 01/29/09	CARB	1	IMPROVE_A	15.0	4.1	19.1	<0.8	3.5	5.1	2.7	3.5
Q09-12987	160-hr Event 01/29/09	DRI	7	IMPROVE_A	12.5	4.0	16.5	1.6	2.1	3.6	2.1	3.2
Q09-12987	160-hr Event 01/29/09	DRI	11	IMPROVE_A	12.4	4.6	17.0	0.3	3.6	3.5	2.1	2.8
Q09-12988	160-hr Event 01/29/09	DRI	11	IMPROVE_A	13.9	5.0	18.8	0.5	3.9	4.0	2.3	3.1
Q09-12988	160-hr Event 01/29/09	DRI	7	IMPROVE_A	13.5	4.6	18.1	1.8	2.5	3.9	1.9	3.5
Q09-12989	160-hr Event 01/29/09	RTI	1	IMPROVE_A	15.1	5.9	21.1	0.8	4.0	4.5	2.7	3.1
Q09-12989	160-hr Event 01/29/09	RTI	F	IMPROVE_A	12.3	5.1	17.5	0.2	3.2	3.7	2.0	3.3
Q09-12990	160-hr Event 01/29/09	RTI	1	IMPROVE_A	15.2	6.1	21.3	0.6	4.1	4.5	2.7	3.3
Q09-12990	160-hr Event 01/29/09	RTI	F	IMPROVE_A	12.9	6.2	19.1	0.3	3.6	4.0	2.2	2.9
Q09-12991	160-hr Event 01/29/09	AQMD	#3	IMPROVE_A	17.3	5.1	22.4	1.4	4.3	5.3	2.6	3.7
Q09-12992	160-hr Event 01/29/09	AQMD	#3	IMPROVE_A	17.0	4.8	21.8	1.3	4.3	5.2	2.8	3.5
Q09-12993	160-hr Event 01/29/09	NAREL	2	IMPROVE_A	14.4	4.9	19.3	0.6	3.3	3.5	1.5	5.4
Q09-12994	160-hr Event 01/29/09	NAREL	2	IMPROVE_A	14.2	4.8	19.0	0.7	3.3	3.3	1.6	5.3
Q09-12997	226-hr Event 07/09/09	CARB	1	IMPROVE_A	15.9	3.4	19.3	<0.8	4.6	4.8	2.4	3.8
Q09-12998	226-hr Event 07/09/09	CARB	1	IMPROVE_A	16.2	3.5	19.7	<0.8	4.7	4.8	2.5	3.8
Q09-12999	226-hr Event 07/09/09	DRI	7	IMPROVE_A	14.0	3.3	17.4	2.6	3.5	2.7	1.7	3.6
Q09-12999	226-hr Event 07/09/09	DRI	6	IMPROVE_A	14.9	3.7	18.6	1.9	4.8	2.6	1.7	3.9
Q09-13000	226-hr Event 07/09/09	DRI	6	IMPROVE_A	13.5	3.6	17.1	1.8	4.2	2.6	1.5	3.4
Q09-13000	226-hr Event 07/09/09	DRI	11	IMPROVE_A	14.4	3.8	18.2	0.7	5.5	3.0	2.0	3.3
Q09-13001	226-hr Event 07/09/09	RTI	1	IMPROVE_A	15.1	5.0	20.2	0.6	5.9	2.9	1.9	3.8
Q09-13001	226-hr Event 07/09/09	RTI	F	IMPROVE_A	15.5	4.4	19.9	0.2	5.6	3.7	2.1	4.0
Q09-13002	226-hr Event 07/09/09	RTI	1	IMPROVE_A	16.7	4.8	21.5	0.7	6.7	2.7	1.8	4.8
Q09-13002	226-hr Event 07/09/09	RTI	F	IMPROVE_A	14.7	4.4	19.2	0.3	5.2	3.7	2.0	3.6
Q09-13003	226-hr Event 07/09/09	AQMD	#3	IMPROVE_A	18.5	4.5	23.1	1.1	7.1	4.4	2.2	3.7
Q09-13004	226-hr Event 07/09/09	AQMD	#2	IMPROVE_A	19.5	4.3	23.8	0.9	6.3	5.3	2.5	4.5
Q09-13005	226-hr Event 07/09/09	NAREL	2	IMPROVE_A	15.1	3.8	18.9	0.6	4.4	3.3	1.5	5.2
Q09-13006	226-hr Event 07/09/09	NAREL	2	IMPROVE_A	15.2	3.7	18.9	0.7	4.6	3.3	1.4	5.3

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
Q09-13012	filter blank	CARB	1	IMPROVE_A	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Q09-13013	filter blank	CARB	1	IMPROVE_A	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Q09-13014	filter blank	DRI	7	IMPROVE_A	0.3	0.0	0.3	0.1	0.1	0.1	0.0	0.0
Q09-13014	filter blank	DRI	6	IMPROVE_A	0.3	0.0	0.3	0.1	0.0	0.2	0.0	0.0
Q09-13015	filter blank	DRI	7	IMPROVE_A	0.5	0.0	0.5	0.1	0.2	0.2	0.0	0.0
Q09-13015	filter blank	DRI	11	IMPROVE_A	0.5	0.0	0.5	0.1	0.2	0.2	0.0	0.0
Q09-13016	filter blank	RTI	1	IMPROVE_A	0.4	0.0	0.4	0.0	0.2	0.3	0.0	0.0
Q09-13016	filter blank	RTI	F	IMPROVE_A	0.5	0.0	0.5	0.0	0.0	0.2	0.1	0.2
Q09-13017	filter blank	RTI	1	IMPROVE_A	0.3	0.0	0.3	0.0	0.2	0.1	0.0	0.0
Q09-13017	filter blank	RTI	F	IMPROVE_A	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Q09-13018	filter blank	AQMD	#2	IMPROVE_A	0.2	<0.25	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45
Q09-13019	filter blank	AQMD	#2	IMPROVE_A	0.2	<0.25	<0.45	<0.45	<0.45	<0.45	<0.45	<0.45
Q09-13020	filter blank	NAREL	2	IMPROVE_A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q09-13021	filter blank	NAREL	2	IMPROVE_A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Q09-12987	160-hr Event 01/29/09	DRI	12	CSN	16.1	1.2	17.2	3.1	3.0	2.2	4.2	3.5
Q09-12987	160-hr Event 01/29/09	DRI	10	CSN	16.8	1.0	17.8	3.4	3.3	2.3	4.0	3.7
Q09-12988	160-hr Event 01/29/09	DRI	12	CSN	16.5	1.1	17.7	3.3	3.2	2.4	4.5	3.2
Q09-12988	160-hr Event 01/29/09	DRI	10	CSN	17.4	1.1	18.5	3.3	3.9	2.5	4.3	3.4
Q09-12989	160-hr Event 01/29/09	RTI	F	CSN	15.7	2.6	18.3	3.2	2.2	2.4	2.8	5.1
Q09-12989	160-hr Event 01/29/09	RTI	T	CSN	17.9	1.9	19.8	3.8	2.6	3.7	6.4	1.4
Q09-12990	160-hr Event 01/29/09	RTI	F	CSN	16.5	2.7	19.2	3.3	2.7	2.1	2.8	5.7
Q09-12990	160-hr Event 01/29/09	RTI	T	CSN	17.8	1.9	19.7	3.9	2.2	3.7	5.9	2.1
Q09-12993	160-hr Event 01/29/09	NAREL	1	CSN	18.7	1.6	20.3	4.2	2.4	1.8	2.3	8.0
Q09-12994	160-hr Event 01/29/09	NAREL	1	CSN	19.1	1.6	20.7	4.1	2.6	1.9	2.0	8.5
Q09-12999	226-hr Event 07/09/09	DRI	8	CSN	17.0	0.9	17.8	5.6	2.5	1.8	4.9	2.1
Q09-12999	226-hr Event 07/09/09	DRI	12	CSN	16.7	0.8	17.5	4.6	3.2	2.1	4.7	2.0
Q09-13000	226-hr Event 07/09/09	DRI	12	CSN	16.2	1.0	17.2	4.6	3.0	2.0	4.3	2.4
Q09-13000	226-hr Event 07/09/09	DRI	8	CSN	16.3	0.7	17.0	5.2	2.4	1.5	3.7	3.4
Q09-13001	226-hr Event 07/09/09	RTI	F	CSN	16.2	2.5	18.7	4.9	2.3	1.9	2.7	4.3
Q09-13001	226-hr Event 07/09/09	RTI	T	CSN	17.8	1.9	19.8	5.5	2.0	3.4	6.2	0.8
Q09-13002	226-hr Event 07/09/09	RTI	F	CSN	16.4	2.7	19.1	5.1	2.5	1.8	2.7	4.2

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
Q09-13002	226-hr Event 07/09/09	RTI	T	CSN	17.8	1.5	19.3	5.7	2.1	3.4	6.2	0.4
Q09-13005	226-hr Event 07/09/09	NAREL	1	CSN	18.0	1.3	19.3	5.8	2.0	1.0	1.5	7.7
Q09-13006	226-hr Event 07/09/09	NAREL	1	CSN	18.9	1.4	20.2	6.3	2.0	1.1	1.7	7.6
Q09-13014	filter blank	DRI	8	CSN	0.2	0.0	0.2	0.1	0.1	0.0	0.0	0.0
Q09-13014	filter blank	DRI	12	CSN	0.2	0.0	0.2	0.1	0.1	0.0	0.0	0.0
Q09-13015	filter blank	DRI	8	CSN	0.4	0.0	0.4	0.2	0.2	0.0	0.0	0.0
Q09-13015	filter blank	DRI	12	CSN	0.5	0.0	0.5	0.1	0.3	0.1	0.0	0.0
Q09-13016	filter blank	RTI	F	CSN	0.2	0.0	0.3	0.0	0.1	0.1	0.0	0.0
Q09-13016	filter blank	RTI	T	CSN	0.2	0.0	0.2	0.0	0.1	0.0	0.0	0.0
Q09-13017	filter blank	RTI	F	CSN	0.2	0.1	0.2	0.0	0.1	0.0	0.0	0.0
Q09-13017	filter blank	RTI	T	CSN	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Q09-13020	filter blank	NAREL	1	CSN	0.2	0.0	0.2	0.1	0.1	0.0	0.0	0.1
Q09-13021	filter blank	NAREL	1	CSN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

**** Instruments identified as CARB #1, DRI #6, #7, #8, #10, #11, #12, AQMD #2, #3, and RTI #1 are DRI/Model 2001 instruments capable of the TOR and the TOT analysis. Instruments identified as RTI "T" and NAREL #1 are early model Sunset instruments set up for the CSN/TOT analysis. The instruments identified as RTI "F" and NAREL #2 are newer Sunset dual-mode instruments capable of the TOR and the TOT analysis.***

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	
168-hr event	T09-13026	CARB	Na	11	-----	-----	-----	5.209	0.465	0.386	-----
168-hr event	T09-13026	CARB	Mg	12	-----	-----	-----	0.646	0.077	0.110	-----
168-hr event	T09-13026	CARB	Al	13	1.470	0.214	0.200	1.752	0.188	0.122	1.582
168-hr event	T09-13026	CARB	Si	14	5.640	0.308	0.060	5.326	0.364	0.108	5.468
168-hr event	T09-13026	CARB	P	15	0.070	0.064	0.040	0.000	0.081	0.098	-----
168-hr event	T09-13026	CARB	S	16	46.920	2.354	0.050	43.471	2.182	0.071	45.031
168-hr event	T09-13026	CARB	Cl	17	0.460	0.046	0.060	0.548	0.043	0.048	-----
168-hr event	T09-13026	CARB	K	19	4.530	0.231	0.070	4.106	0.208	0.038	4.216
168-hr event	T09-13026	CARB	Ca	20	1.610	0.086	0.060	1.515	0.079	0.046	1.628
168-hr event	T09-13026	CARB	Ti	22	0.150	0.025	0.040	0.113	0.022	0.042	-----
168-hr event	T09-13026	CARB	V	23	<0.03	-----	0.030	0.000	0.013	0.029	-----
168-hr event	T09-13026	CARB	Cr	24	<0.03	-----	0.030	0.013	0.009	0.021	-----
168-hr event	T09-13026	CARB	Mn	25	0.090	0.010	0.030	0.069	0.009	0.017	-----
168-hr event	T09-13026	CARB	Fe	26	1.950	0.102	0.040	1.985	0.101	0.014	1.970
168-hr event	T09-13026	CARB	Co	27	<0.03	-----	0.030	0.021	0.007	0.011	-----
168-hr event	T09-13026	CARB	Ni	28	<0.03	-----	0.030	0.009	0.005	0.011	-----
168-hr event	T09-13026	CARB	Cu	29	0.080	0.016	0.040	0.045	0.008	0.013	-----
168-hr event	T09-13026	CARB	Zn	30	0.420	0.034	0.020	0.386	0.022	0.034	0.415
168-hr event	T09-13026	CARB	As	33	0.020	0.014	0.020	0.038	0.016	0.016	-----
168-hr event	T09-13026	CARB	Se	34	0.030	0.009	0.020	0.016	0.012	0.019	-----
168-hr event	T09-13026	CARB	Br	35	0.290	0.021	0.020	0.345	0.026	0.017	0.312
168-hr event	T09-13026	CARB	Rb	37	<0.02	-----	0.020	0.000	0.005	0.017	-----
168-hr event	T09-13026	CARB	Sr	38	0.030	0.011	0.030	0.000	0.006	0.022	-----
168-hr event	T09-13026	CARB	Zr	40	-----	-----	-----	0.011	0.124	0.044	-----
168-hr event	T09-13026	CARB	Ag	47	-----	-----	-----	0.000	0.045	0.142	-----
168-hr event	T09-13026	CARB	Cd	48	-----	-----	-----	0.000	0.047	0.180	-----
168-hr event	T09-13026	CARB	In	49	-----	-----	-----	0.000	0.050	0.213	-----
168-hr event	T09-13026	CARB	Sn	50	0.230	0.113	0.200	0.102	0.328	0.307	-----
168-hr event	T09-13026	CARB	Sb	51	0.280	0.140	0.200	0.000	0.104	0.403	-----
168-hr event	T09-13026	CARB	Cs	55	-----	-----	-----	0.020	0.059	0.331	-----
168-hr event	T09-13026	CARB	Ba	56	<0.2	-----	0.200	0.000	0.038	0.099	-----
168-hr event	T09-13026	CARB	Ce	58	-----	-----	-----	0.000	0.032	0.066	-----
168-hr event	T09-13026	CARB	Pb	82	0.120	0.023	0.030	0.054	0.030	0.047	-----
168-hr event	T09-13027	CARB	Na	11	-----	-----	-----	5.548	0.490	0.386	-----
168-hr event	T09-13027	CARB	Mg	12	-----	-----	-----	0.745	0.081	0.110	-----
168-hr event	T09-13027	CARB	Al	13	1.580	0.215	0.200	1.740	0.188	0.122	1.582
168-hr event	T09-13027	CARB	Si	14	5.440	0.299	0.060	5.468	0.374	0.108	5.468
168-hr event	T09-13027	CARB	P	15	<0.04	-----	0.040	0.000	0.081	0.098	-----
168-hr event	T09-13027	CARB	S	16	45.260	2.270	0.050	44.341	2.225	0.071	45.031
168-hr event	T09-13027	CARB	Cl	17	0.480	0.047	0.060	0.548	0.043	0.048	-----
168-hr event	T09-13027	CARB	K	19	4.370	0.223	0.070	4.226	0.214	0.038	4.216
168-hr event	T09-13027	CARB	Ca	20	1.580	0.084	0.060	1.628	0.084	0.046	1.628
168-hr event	T09-13027	CARB	Ti	22	0.170	0.027	0.040	0.162	0.019	0.042	-----

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	
168-hr event	T09-13027	CARB	V	23	<0.03	-----	0.030	0.001	0.014	0.029	-----
168-hr event	T09-13027	CARB	Cr	24	<0.03	-----	0.030	0.009	0.009	0.021	-----
168-hr event	T09-13027	CARB	Mn	25	0.080	0.010	0.030	0.081	0.009	0.017	-----
168-hr event	T09-13027	CARB	Fe	26	1.870	0.097	0.040	1.990	0.102	0.014	1.970
168-hr event	T09-13027	CARB	Co	27	<0.03	-----	0.030	0.007	0.007	0.011	-----
168-hr event	T09-13027	CARB	Ni	28	<0.03	-----	0.030	0.020	0.005	0.011	-----
168-hr event	T09-13027	CARB	Cu	29	0.090	0.016	0.040	0.064	0.008	0.013	-----
168-hr event	T09-13027	CARB	Zn	30	0.400	0.033	0.020	0.415	0.023	0.034	0.415
168-hr event	T09-13027	CARB	As	33	<0.02	-----	0.020	0.024	0.017	0.016	-----
168-hr event	T09-13027	CARB	Se	34	0.030	0.009	0.020	0.034	0.011	0.019	-----
168-hr event	T09-13027	CARB	Br	35	0.280	0.021	0.020	0.313	0.026	0.017	0.312
168-hr event	T09-13027	CARB	Rb	37	<0.02	-----	0.020	0.000	0.005	0.017	-----
168-hr event	T09-13027	CARB	Sr	38	0.040	0.012	0.030	0.026	0.014	0.022	-----
168-hr event	T09-13027	CARB	Zr	40	-----	-----	-----	0.000	0.081	0.044	-----
168-hr event	T09-13027	CARB	Ag	47	-----	-----	-----	0.000	0.045	0.142	-----
168-hr event	T09-13027	CARB	Cd	48	-----	-----	-----	0.000	0.047	0.180	-----
168-hr event	T09-13027	CARB	In	49	-----	-----	-----	0.000	0.050	0.213	-----
168-hr event	T09-13027	CARB	Sn	50	<0.2	-----	0.200	0.226	0.317	0.307	-----
168-hr event	T09-13027	CARB	Sb	51	<0.2	-----	0.200	0.170	0.429	0.403	-----
168-hr event	T09-13027	CARB	Cs	55	-----	-----	-----	0.000	0.041	0.331	-----
168-hr event	T09-13027	CARB	Ba	56	<0.2	-----	0.200	0.000	0.046	0.099	-----
168-hr event	T09-13027	CARB	Ce	58	-----	-----	-----	0.000	0.032	0.066	-----
168-hr event	T09-13027	CARB	Pb	82	0.110	0.023	0.030	0.078	0.031	0.047	-----
168-hr event	T09-13028	DRI	Na	11	11.021	1.936	0.911	4.927	0.439	0.386	-----
168-hr event	T09-13028	DRI	Mg	12	0.000	0.510	0.346	0.723	0.079	0.110	-----
168-hr event	T09-13028	DRI	Al	13	1.549	0.108	0.079	1.729	0.187	0.122	1.582
168-hr event	T09-13028	DRI	Si	14	4.639	0.078	0.092	5.252	0.360	0.108	5.468
168-hr event	T09-13028	DRI	P	15	0.000	0.017	0.027	0.000	0.081	0.098	-----
168-hr event	T09-13028	DRI	S	16	51.657	0.194	0.075	43.132	2.165	0.071	45.031
168-hr event	T09-13028	DRI	Cl	17	0.304	0.017	0.019	0.588	0.044	0.048	-----
168-hr event	T09-13028	DRI	K	19	4.490	0.028	0.017	4.105	0.208	0.038	4.216
168-hr event	T09-13028	DRI	Ca	20	1.821	0.072	0.021	1.497	0.078	0.046	1.628
168-hr event	T09-13028	DRI	Ti	22	0.145	0.025	0.013	0.106	0.022	0.042	-----
168-hr event	T09-13028	DRI	V	23	0.014	0.017	0.001	0.000	0.013	0.029	-----
168-hr event	T09-13028	DRI	Cr	24	0.064	0.017	0.012	0.023	0.010	0.021	-----
168-hr event	T09-13028	DRI	Mn	25	0.078	0.051	0.024	0.075	0.009	0.017	-----
168-hr event	T09-13028	DRI	Fe	26	2.291	0.021	0.031	1.900	0.097	0.014	1.970
168-hr event	T09-13028	DRI	Co	27	0.000	0.017	0.001	0.013	0.007	0.011	-----
168-hr event	T09-13028	DRI	Ni	28	0.018	0.048	0.006	0.022	0.005	0.011	-----
168-hr event	T09-13028	DRI	Cu	29	0.098	0.060	0.010	0.058	0.008	0.013	-----
168-hr event	T09-13028	DRI	Zn	30	0.607	0.018	0.010	0.402	0.023	0.034	0.415
168-hr event	T09-13028	DRI	As	33	0.000	0.017	0.001	0.025	0.016	0.016	-----
168-hr event	T09-13028	DRI	Se	34	0.006	0.017	0.024	0.003	0.012	0.019	-----
168-hr event	T09-13028	DRI	Br	35	0.313	0.017	0.017	0.301	0.024	0.017	0.312

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	
168-hr event	T09-13028	DRI	Rb	37	0.000	0.017	0.013	0.000	0.007	0.017	-----
168-hr event	T09-13028	DRI	Sr	38	0.052	0.017	0.023	0.006	0.015	0.022	-----
168-hr event	T09-13028	DRI	Zr	40	0.070	0.028	0.041	0.000	0.081	0.044	-----
168-hr event	T09-13028	DRI	Ag	47	0.000	0.038	0.049	0.000	0.045	0.142	-----
168-hr event	T09-13028	DRI	Cd	48	0.071	0.049	0.060	0.000	0.047	0.180	-----
168-hr event	T09-13028	DRI	In	49	0.000	0.051	0.036	0.079	0.237	0.213	-----
168-hr event	T09-13028	DRI	Sn	50	0.079	0.051	0.045	0.170	0.339	0.307	-----
168-hr event	T09-13028	DRI	Sb	51	0.000	0.081	0.084	0.000	0.104	0.403	-----
168-hr event	T09-13028	DRI	Cs	55	0.000	0.166	0.014	0.131	0.065	0.331	-----
168-hr event	T09-13028	DRI	Ba	56	0.000	0.192	0.007	0.000	0.038	0.099	-----
168-hr event	T09-13028	DRI	Ce	58	0.000	0.226	0.015	0.000	0.032	0.066	-----
168-hr event	T09-13028	DRI	Pb	82	0.065	0.018	0.030	0.062	0.030	0.047	-----
168-hr event	T09-13029	DRI	Na	11	10.130	1.911	0.911	5.085	0.451	0.386	-----
168-hr event	T09-13029	DRI	Mg	12	0.000	0.508	0.346	0.551	0.073	0.110	-----
168-hr event	T09-13029	DRI	Al	13	1.720	0.109	0.079	1.582	0.181	0.122	1.582
168-hr event	T09-13029	DRI	Si	14	4.773	0.079	0.092	5.503	0.376	0.108	5.468
168-hr event	T09-13029	DRI	P	15	0.000	0.017	0.027	0.000	0.081	0.098	-----
168-hr event	T09-13029	DRI	S	16	50.908	0.190	0.075	43.697	2.193	0.071	45.031
168-hr event	T09-13029	DRI	Cl	17	0.329	0.017	0.019	0.597	0.044	0.048	-----
168-hr event	T09-13029	DRI	K	19	4.448	0.028	0.017	4.216	0.213	0.038	4.216
168-hr event	T09-13029	DRI	Ca	20	1.725	0.072	0.021	1.557	0.081	0.046	1.628
168-hr event	T09-13029	DRI	Ti	22	0.184	0.025	0.013	0.089	0.021	0.042	-----
168-hr event	T09-13029	DRI	V	23	0.023	0.017	0.001	0.001	0.012	0.029	-----
168-hr event	T09-13029	DRI	Cr	24	0.008	0.017	0.012	0.000	0.007	0.021	-----
168-hr event	T09-13029	DRI	Mn	25	0.053	0.051	0.024	0.077	0.009	0.017	-----
168-hr event	T09-13029	DRI	Fe	26	2.207	0.021	0.031	1.972	0.101	0.014	1.970
168-hr event	T09-13029	DRI	Co	27	0.000	0.017	0.001	0.007	0.007	0.011	-----
168-hr event	T09-13029	DRI	Ni	28	0.000	0.048	0.006	0.011	0.004	0.011	-----
168-hr event	T09-13029	DRI	Cu	29	0.064	0.060	0.010	0.061	0.008	0.013	-----
168-hr event	T09-13029	DRI	Zn	30	0.483	0.017	0.010	0.415	0.023	0.034	0.415
168-hr event	T09-13029	DRI	As	33	0.000	0.017	0.001	0.040	0.016	0.016	-----
168-hr event	T09-13029	DRI	Se	34	0.014	0.017	0.024	0.018	0.012	0.019	-----
168-hr event	T09-13029	DRI	Br	35	0.260	0.017	0.017	0.316	0.025	0.017	0.312
168-hr event	T09-13029	DRI	Rb	37	0.000	0.017	0.013	0.000	0.007	0.017	-----
168-hr event	T09-13029	DRI	Sr	38	0.042	0.017	0.023	0.036	0.014	0.022	-----
168-hr event	T09-13029	DRI	Zr	40	0.015	0.028	0.041	0.023	0.124	0.044	-----
168-hr event	T09-13029	DRI	Ag	47	0.048	0.039	0.049	0.000	0.045	0.142	-----
168-hr event	T09-13029	DRI	Cd	48	0.000	0.048	0.060	0.000	0.047	0.180	-----
168-hr event	T09-13029	DRI	In	49	0.000	0.051	0.036	0.045	0.237	0.213	-----
168-hr event	T09-13029	DRI	Sn	50	0.057	0.051	0.045	0.000	0.088	0.307	-----
168-hr event	T09-13029	DRI	Sb	51	0.000	0.081	0.084	0.000	0.104	0.403	-----
168-hr event	T09-13029	DRI	Cs	55	0.000	0.166	0.014	0.000	0.041	0.331	-----
168-hr event	T09-13029	DRI	Ba	56	0.000	0.192	0.007	0.000	0.038	0.099	-----
168-hr event	T09-13029	DRI	Ce	58	0.000	0.225	0.015	0.000	0.032	0.066	-----

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	
168-hr event	T09-13029	DRI	Pb	82	0.086	0.019	0.030	0.070	0.030	0.047	-----
168-hr event	T09-13030	ODEQ	Na	11	-----	-----	-----	4.791	0.433	0.386	-----
168-hr event	T09-13030	ODEQ	Mg	12	-----	-----	-----	0.453	0.070	0.110	-----
168-hr event	T09-13030	ODEQ	Al	13	1.410	0.142	0.260	1.469	0.186	0.122	1.582
168-hr event	T09-13030	ODEQ	Si	14	6.790	0.594	0.720	5.386	0.369	0.108	5.468
168-hr event	T09-13030	ODEQ	P	15	<0.44	0.153	0.440	0.000	0.084	0.098	-----
168-hr event	T09-13030	ODEQ	S	16	52.600	4.231	1.300	44.748	2.246	0.071	45.031
168-hr event	T09-13030	ODEQ	Cl	17	<1.1	0.367	1.100	0.634	0.046	0.048	-----
168-hr event	T09-13030	ODEQ	K	19	4.410	0.357	0.170	4.282	0.216	0.038	4.216
168-hr event	T09-13030	ODEQ	Ca	20	1.820	0.159	0.190	1.527	0.080	0.046	1.628
168-hr event	T09-13030	ODEQ	Ti	22	0.170	0.050	0.150	0.134	0.025	0.042	-----
168-hr event	T09-13030	ODEQ	V	23	<0.051	0.017	0.051	0.000	0.013	0.029	-----
168-hr event	T09-13030	ODEQ	Cr	24	<0.033	0.011	0.033	0.003	0.010	0.021	-----
168-hr event	T09-13030	ODEQ	Mn	25	0.087	0.016	0.042	0.080	0.009	0.017	-----
168-hr event	T09-13030	ODEQ	Fe	26	1.970	0.159	0.073	2.016	0.103	0.014	1.970
168-hr event	T09-13030	ODEQ	Co	27	<0.045	0.015	0.045	0.020	0.008	0.011	-----
168-hr event	T09-13030	ODEQ	Ni	28	<0.023	0.008	0.023	0.009	0.005	0.011	-----
168-hr event	T09-13030	ODEQ	Cu	29	<0.10 est	0.035	0.100	0.057	0.008	0.013	-----
168-hr event	T09-13030	ODEQ	Zn	30	0.438	0.037	0.031	0.411	0.023	0.034	0.415
168-hr event	T09-13030	ODEQ	As	33	0.053	0.013	0.035	0.023	0.017	0.016	-----
168-hr event	T09-13030	ODEQ	Se	34	0.031	0.011	0.031	0.047	0.014	0.019	-----
168-hr event	T09-13030	ODEQ	Br	35	0.276	0.025	0.033	0.315	0.027	0.017	0.312
168-hr event	T09-13030	ODEQ	Rb	37	<0.030	0.010	0.030	0.000	0.007	0.017	-----
168-hr event	T09-13030	ODEQ	Sr	38	<0.024	0.008	0.024	0.014	0.015	0.022	-----
168-hr event	T09-13030	ODEQ	Zr	40	<0.036	0.012	0.036	0.000	0.081	0.044	-----
168-hr event	T09-13030	ODEQ	Ag	47	<0.095	0.032	0.095	0.000	0.045	0.142	-----
168-hr event	T09-13030	ODEQ	Cd	48	<0.099	0.033	0.099	0.000	0.047	0.180	-----
168-hr event	T09-13030	ODEQ	In	49	<0.11	0.036	0.110	0.011	0.249	0.213	-----
168-hr event	T09-13030	ODEQ	Sn	50	<0.16	0.055	0.160	0.000	0.088	0.307	-----
168-hr event	T09-13030	ODEQ	Sb	51	<0.16	0.053	0.160	0.463	0.464	0.403	-----
168-hr event	T09-13030	ODEQ	Cs	55	<0.26	0.087	0.260	0.000	0.041	0.331	-----
168-hr event	T09-13030	ODEQ	Ba	56	<0.37	0.123	0.370	0.000	0.046	0.099	-----
168-hr event	T09-13030	ODEQ	Ce	58	<0.65	0.218	0.650	0.000	0.032	0.066	-----
168-hr event	T09-13030	ODEQ	Pb	82	0.075	0.026	0.075	0.044	0.032	0.047	-----
168-hr event	T09-13031	ODEQ	Na	11	-----	-----	-----	4.938	0.444	0.386	-----
168-hr event	T09-13031	ODEQ	Mg	12	-----	-----	-----	0.634	0.077	0.110	-----
168-hr event	T09-13031	ODEQ	Al	13	1.300	0.134	0.260	1.571	0.190	0.122	1.582
168-hr event	T09-13031	ODEQ	Si	14	6.140	0.537	0.660	5.137	0.353	0.108	5.468
168-hr event	T09-13031	ODEQ	P	15	<0.39	0.137	0.390	0.000	0.081	0.098	-----
168-hr event	T09-13031	ODEQ	S	16	47.100	3.788	1.200	43.313	2.174	0.071	45.031
168-hr event	T09-13031	ODEQ	Cl	17	<0.98	0.329	0.980	0.637	0.047	0.048	-----
168-hr event	T09-13031	ODEQ	K	19	4.010	0.325	0.170	4.152	0.210	0.038	4.216
168-hr event	T09-13031	ODEQ	Ca	20	1.610	0.143	0.180	1.474	0.077	0.046	1.628
168-hr event	T09-13031	ODEQ	Ti	22	<0.15	0.052	0.150	0.140	0.024	0.042	-----

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	
168-hr event	T09-13031	ODEQ	V	23	<0.054	0.018	0.054	0.000	0.013	0.029	-----
168-hr event	T09-13031	ODEQ	Cr	24	<0.033	0.011	0.033	0.000	0.009	0.021	-----
168-hr event	T09-13031	ODEQ	Mn	25	0.068	0.015	0.043	0.081	0.009	0.017	-----
168-hr event	T09-13031	ODEQ	Fe	26	1.820	0.147	0.071	1.879	0.096	0.014	1.970
168-hr event	T09-13031	ODEQ	Co	27	<0.044	0.015	0.044	0.017	0.007	0.011	-----
168-hr event	T09-13031	ODEQ	Ni	28	0.027	0.008	0.023	0.005	0.005	0.011	-----
168-hr event	T09-13031	ODEQ	Cu	29	<0.10 est	0.035	0.100	0.053	0.009	0.013	-----
168-hr event	T09-13031	ODEQ	Zn	30	0.383	0.032	0.031	0.375	0.022	0.034	0.415
168-hr event	T09-13031	ODEQ	As	33	<0.037	0.013	0.037	0.035	0.017	0.016	-----
168-hr event	T09-13031	ODEQ	Se	34	<0.032	0.011	0.032	0.042	0.014	0.019	-----
168-hr event	T09-13031	ODEQ	Br	35	0.252	0.023	0.033	0.292	0.026	0.017	0.312
168-hr event	T09-13031	ODEQ	Rb	37	<0.031	0.010	0.031	0.000	0.007	0.017	-----
168-hr event	T09-13031	ODEQ	Sr	38	<0.027	0.009	0.027	0.000	0.006	0.022	-----
168-hr event	T09-13031	ODEQ	Zr	40	<0.040	0.013	0.040	0.000	0.081	0.044	-----
168-hr event	T09-13031	ODEQ	Ag	47	<0.098	0.033	0.098	0.000	0.045	0.142	-----
168-hr event	T09-13031	ODEQ	Cd	48	<0.10	0.035	0.100	0.000	0.047	0.180	-----
168-hr event	T09-13031	ODEQ	In	49	<0.11	0.038	0.110	0.113	0.249	0.213	-----
168-hr event	T09-13031	ODEQ	Sn	50	<0.17	0.057	0.170	0.000	0.088	0.307	-----
168-hr event	T09-13031	ODEQ	Sb	51	<0.17	0.055	0.170	0.000	0.120	0.403	-----
168-hr event	T09-13031	ODEQ	Cs	55	<0.28	0.092	0.280	0.000	0.041	0.331	-----
168-hr event	T09-13031	ODEQ	Ba	56	<0.39	0.130	0.390	0.000	0.046	0.099	-----
168-hr event	T09-13031	ODEQ	Ce	58	<0.69	0.230	0.690	0.000	0.032	0.066	-----
168-hr event	T09-13031	ODEQ	Pb	82	0.084	0.027	0.078	0.070	0.031	0.047	-----
168-hr event	T09-13032	AQMD	Na	11	-----	-----	-----	4.735	0.424	0.386	-----
168-hr event	T09-13032	AQMD	Mg	12	ND	0.950	1.680	0.451	0.070	0.110	-----
168-hr event	T09-13032	AQMD	Al	13	3.499	0.903	1.200	1.446	0.176	0.122	1.582
168-hr event	T09-13032	AQMD	Si	14	8.088	2.000	2.600	5.356	0.367	0.108	5.468
168-hr event	T09-13032	AQMD	P	15	1.010	0.880	1.585	0.000	0.081	0.098	-----
168-hr event	T09-13032	AQMD	S	16	42.073	3.769	0.251	45.031	2.260	0.071	45.031
168-hr event	T09-13032	AQMD	Cl	17	0.359	0.118	0.174	0.577	0.044	0.048	-----
168-hr event	T09-13032	AQMD	K	19	3.732	0.354	0.061	4.320	0.218	0.038	4.216
168-hr event	T09-13032	AQMD	Ca	20	1.798	0.189	0.067	1.617	0.084	0.046	1.628
168-hr event	T09-13032	AQMD	Ti	22	0.133	0.042	0.061	0.158	0.023	0.042	-----
168-hr event	T09-13032	AQMD	V	23	ND	-----	0.070	0.016	0.014	0.029	-----
168-hr event	T09-13032	AQMD	Cr	24	ND	-----	0.060	0.000	0.007	0.021	-----
168-hr event	T09-13032	AQMD	Mn	25	0.083	0.042	0.070	0.056	0.010	0.017	-----
168-hr event	T09-13032	AQMD	Fe	26	1.992	0.190	0.035	1.948	0.100	0.014	1.970
168-hr event	T09-13032	AQMD	Co	27	ND	-----	0.020	0.012	0.007	0.011	-----
168-hr event	T09-13032	AQMD	Ni	28	ND	-----	0.013	0.020	0.004	0.011	-----
168-hr event	T09-13032	AQMD	Cu	29	0.053	0.013	0.018	0.066	0.008	0.013	-----
168-hr event	T09-13032	AQMD	Zn	30	0.432	0.048	0.021	0.428	0.024	0.034	0.415
168-hr event	T09-13032	AQMD	As	33	ND	-----	0.130	0.029	0.016	0.016	-----
168-hr event	T09-13032	AQMD	Se	34	ND	-----	0.070	0.040	0.013	0.019	-----
168-hr event	T09-13032	AQMD	Br	35	0.331	0.038	0.019	0.321	0.026	0.017	0.312

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	
168-hr event	T09-13032	AQMD	Rb	37	ND	-----	0.070	0.000	0.007	0.017	-----
168-hr event	T09-13032	AQMD	Sr	38	ND	-----	0.030	0.027	0.014	0.022	-----
168-hr event	T09-13032	AQMD	Zr	40	-----	-----	-----	0.000	0.081	0.044	-----
168-hr event	T09-13032	AQMD	Ag	47	ND	-----	0.180	0.000	0.045	0.142	-----
168-hr event	T09-13032	AQMD	Cd	48	ND	-----	0.210	0.000	0.047	0.180	-----
168-hr event	T09-13032	AQMD	In	49	ND	-----	0.030	0.000	0.050	0.213	-----
168-hr event	T09-13032	AQMD	Sn	50	0.133	0.017	0.010	0.000	0.088	0.307	-----
168-hr event	T09-13032	AQMD	Sb	51	ND	-----	0.530	0.000	0.104	0.403	-----
168-hr event	T09-13032	AQMD	Cs	55	ND	-----	0.070	0.116	0.060	0.331	-----
168-hr event	T09-13032	AQMD	Ba	56	ND	-----	0.290	0.064	0.077	0.099	-----
168-hr event	T09-13032	AQMD	Ce	58	-----	-----	-----	0.018	0.036	0.066	-----
168-hr event	T09-13032	AQMD	Pb	82	0.194	0.107	0.180	0.059	0.028	0.047	-----
168-hr event	T09-13033	AQMD	Na	11	-----	-----	-----	4.904	0.442	0.386	-----
168-hr event	T09-13033	AQMD	Mg	12	ND	-----	1.680	0.298	0.066	0.110	-----
168-hr event	T09-13033	AQMD	Al	13	3.733	0.323	1.200	1.503	0.188	0.122	1.582
168-hr event	T09-13033	AQMD	Si	14	8.106	0.702	2.600	5.442	0.373	0.108	5.468
168-hr event	T09-13033	AQMD	P	15	ND	-----	1.585	0.000	0.084	0.098	-----
168-hr event	T09-13033	AQMD	S	16	45.091	3.905	0.251	43.708	2.194	0.071	45.031
168-hr event	T09-13033	AQMD	Cl	17	0.383	0.033	0.174	0.549	0.044	0.048	-----
168-hr event	T09-13033	AQMD	K	19	3.630	0.314	0.061	4.172	0.211	0.038	4.216
168-hr event	T09-13033	AQMD	Ca	20	1.870	0.162	0.067	1.487	0.078	0.046	1.628
168-hr event	T09-13033	AQMD	Ti	22	0.193	0.017	0.061	0.140	0.019	0.042	-----
168-hr event	T09-13033	AQMD	V	23	ND	-----	0.070	0.000	0.013	0.029	-----
168-hr event	T09-13033	AQMD	Cr	24	ND	-----	0.060	0.001	0.009	0.021	-----
168-hr event	T09-13033	AQMD	Mn	25	0.137	0.012	0.070	0.089	0.010	0.017	-----
168-hr event	T09-13033	AQMD	Fe	26	1.968	0.170	0.035	1.901	0.097	0.014	1.970
168-hr event	T09-13033	AQMD	Co	27	ND	-----	0.020	0.015	0.008	0.011	-----
168-hr event	T09-13033	AQMD	Ni	28	ND	-----	0.013	0.009	0.005	0.011	-----
168-hr event	T09-13033	AQMD	Cu	29	0.065	0.006	0.018	0.040	0.008	0.013	-----
168-hr event	T09-13033	AQMD	Zn	30	0.420	0.036	0.021	0.399	0.023	0.034	0.415
168-hr event	T09-13033	AQMD	As	33	ND	-----	0.130	0.040	0.017	0.016	-----
168-hr event	T09-13033	AQMD	Se	34	ND	-----	0.070	0.033	0.014	0.019	-----
168-hr event	T09-13033	AQMD	Br	35	0.409	0.035	0.019	0.327	0.026	0.017	0.312
168-hr event	T09-13033	AQMD	Rb	37	ND	-----	0.070	0.000	0.007	0.017	-----
168-hr event	T09-13033	AQMD	Sr	38	ND	-----	0.030	0.037	0.016	0.022	-----
168-hr event	T09-13033	AQMD	Zr	40	-----	-----	-----	0.000	0.081	0.044	-----
168-hr event	T09-13033	AQMD	Ag	47	ND	-----	0.180	0.000	0.045	0.142	-----
168-hr event	T09-13033	AQMD	Cd	48	ND	-----	0.210	0.000	0.047	0.180	-----
168-hr event	T09-13033	AQMD	In	49	ND	-----	0.030	0.011	0.249	0.213	-----
168-hr event	T09-13033	AQMD	Sn	50	0.049	0.004	0.010	0.000	0.088	0.307	-----
168-hr event	T09-13033	AQMD	Sb	51	ND	-----	0.530	0.000	0.104	0.403	-----
168-hr event	T09-13033	AQMD	Cs	55	ND	-----	0.070	0.000	0.041	0.331	-----
168-hr event	T09-13033	AQMD	Ba	56	0.458	0.040	0.290	0.000	0.046	0.099	-----
168-hr event	T09-13033	AQMD	Ce	58	-----	-----	-----	0.000	0.032	0.066	-----

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	
168-hr event	T09-13033	AQMD	Pb	82	0.212	0.018	0.180	0.053	0.033	0.047	-----
168-hr event	T09-13034	UCD	Na	11	14.603	1.898	0.574	5.074	0.454	0.386	-----
168-hr event	T09-13034	UCD	Mg	12	0.769	0.227	0.192	0.729	0.080	0.110	-----
168-hr event	T09-13034	UCD	Al	13	2.048	0.255	0.097	1.367	0.183	0.122	1.582
168-hr event	T09-13034	UCD	Si	14	7.885	0.457	0.053	5.082	0.350	0.108	5.468
168-hr event	T09-13034	UCD	P	15	0.000	0.000	0.033	0.000	0.081	0.098	-----
168-hr event	T09-13034	UCD	S	16	43.928	2.218	0.021	43.042	2.160	0.071	45.031
168-hr event	T09-13034	UCD	Cl	17	0.000	0.000	0.014	0.503	0.042	0.048	-----
168-hr event	T09-13034	UCD	K	19	4.008	0.208	0.007	4.111	0.208	0.038	4.216
168-hr event	T09-13034	UCD	Ca	20	1.681	0.091	0.004	1.414	0.074	0.046	1.628
168-hr event	T09-13034	UCD	Ti	22	0.139	0.010	0.002	0.116	0.023	0.042	-----
168-hr event	T09-13034	UCD	V	23	0.018	0.005	0.002	0.000	0.013	0.029	-----
168-hr event	T09-13034	UCD	Cr	24	0.006	0.002	0.001	0.023	0.011	0.021	-----
168-hr event	T09-13034	UCD	Mn	25	0.058	0.005	0.002	0.079	0.010	0.017	-----
168-hr event	T09-13034	UCD	Fe	26	1.935	0.099	0.003	1.836	0.094	0.014	1.970
168-hr event	T09-13034	UCD	Co	27	-----	-----	-----	0.003	0.007	0.011	-----
168-hr event	T09-13034	UCD	Ni	28	0.000	0.000	0.002	0.015	0.005	0.011	-----
168-hr event	T09-13034	UCD	Cu	29	0.059	0.005	0.002	0.068	0.009	0.013	-----
168-hr event	T09-13034	UCD	Zn	30	0.437	0.024	0.001	0.404	0.023	0.034	0.415
168-hr event	T09-13034	UCD	As	33	0.039	0.007	0.004	0.033	0.018	0.016	-----
168-hr event	T09-13034	UCD	Se	34	0.036	0.003	0.001	0.038	0.014	0.019	-----
168-hr event	T09-13034	UCD	Br	35	0.316	0.017	0.001	0.308	0.026	0.017	0.312
168-hr event	T09-13034	UCD	Rb	37	0.021	0.007	0.003	0.000	0.007	0.017	-----
168-hr event	T09-13034	UCD	Sr	38	0.033	0.007	0.004	0.011	0.016	0.022	-----
168-hr event	T09-13034	UCD	Zr	40	0.064	0.011	0.006	0.000	0.081	0.044	-----
168-hr event	T09-13034	UCD	Ag	47	-----	-----	-----	0.011	0.147	0.142	-----
168-hr event	T09-13034	UCD	Cd	48	-----	-----	-----	0.000	0.047	0.180	-----
168-hr event	T09-13034	UCD	In	49	-----	-----	-----	0.000	0.069	0.213	-----
168-hr event	T09-13034	UCD	Sn	50	-----	-----	-----	0.000	0.088	0.307	-----
168-hr event	T09-13034	UCD	Sb	51	-----	-----	-----	0.000	0.120	0.403	-----
168-hr event	T09-13034	UCD	Cs	55	-----	-----	-----	0.000	0.041	0.331	-----
168-hr event	T09-13034	UCD	Ba	56	-----	-----	-----	0.000	0.046	0.099	-----
168-hr event	T09-13034	UCD	Ce	58	-----	-----	-----	0.000	0.032	0.066	-----
168-hr event	T09-13034	UCD	Pb	82	0.080	0.012	0.002	0.073	0.032	0.047	-----
168-hr event	T09-13035	UCD	Na	11	8.272	1.233	0.571	4.452	0.403	0.386	-----
168-hr event	T09-13035	UCD	Mg	12	0.000	0.000	0.192	0.624	0.076	0.110	-----
168-hr event	T09-13035	UCD	Al	13	2.027	0.235	0.097	1.356	0.183	0.122	1.582
168-hr event	T09-13035	UCD	Si	14	7.905	0.458	0.053	4.974	0.342	0.108	5.468
168-hr event	T09-13035	UCD	P	15	0.000	0.000	0.033	0.000	0.084	0.098	-----
168-hr event	T09-13035	UCD	S	16	44.765	2.260	0.021	41.720	2.095	0.071	45.031
168-hr event	T09-13035	UCD	Cl	17	0.000	0.000	0.014	0.490	0.042	0.048	-----
168-hr event	T09-13035	UCD	K	19	4.111	0.213	0.007	4.022	0.204	0.038	4.216
168-hr event	T09-13035	UCD	Ca	20	1.706	0.093	0.004	1.367	0.072	0.046	1.628
168-hr event	T09-13035	UCD	Ti	22	0.138	0.010	0.002	0.041	0.025	0.042	-----

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	
168-hr event	T09-13035	UCD	V	23	0.022	0.006	0.002	0.029	0.017	0.029	-----
168-hr event	T09-13035	UCD	Cr	24	0.000	0.000	0.001	0.009	0.011	0.021	-----
168-hr event	T09-13035	UCD	Mn	25	0.058	0.005	0.002	0.070	0.012	0.017	-----
168-hr event	T09-13035	UCD	Fe	26	1.873	0.096	0.003	1.750	0.090	0.014	1.970
168-hr event	T09-13035	UCD	Co	27	-----	-----	-----	0.006	0.008	0.011	-----
168-hr event	T09-13035	UCD	Ni	28	0.013	0.003	0.002	0.010	0.005	0.011	-----
168-hr event	T09-13035	UCD	Cu	29	0.051	0.005	0.002	0.049	0.009	0.013	-----
168-hr event	T09-13035	UCD	Zn	30	0.410	0.022	0.001	0.399	0.023	0.034	0.415
168-hr event	T09-13035	UCD	As	33	0.044	0.007	0.004	0.019	0.018	0.016	-----
168-hr event	T09-13035	UCD	Se	34	0.037	0.004	0.001	0.045	0.014	0.019	-----
168-hr event	T09-13035	UCD	Br	35	0.312	0.017	0.001	0.330	0.026	0.017	0.312
168-hr event	T09-13035	UCD	Rb	37	0.050	0.011	0.003	0.000	0.007	0.017	-----
168-hr event	T09-13035	UCD	Sr	38	0.033	0.006	0.004	0.003	0.016	0.022	-----
168-hr event	T09-13035	UCD	Zr	40	0.039	0.010	0.007	0.000	0.081	0.044	-----
168-hr event	T09-13035	UCD	Ag	47	-----	-----	-----	0.124	0.158	0.142	-----
168-hr event	T09-13035	UCD	Cd	48	-----	-----	-----	0.000	0.047	0.180	-----
168-hr event	T09-13035	UCD	In	49	-----	-----	-----	0.000	0.069	0.213	-----
168-hr event	T09-13035	UCD	Sn	50	-----	-----	-----	0.000	0.106	0.307	-----
168-hr event	T09-13035	UCD	Sb	51	-----	-----	-----	0.000	0.120	0.403	-----
168-hr event	T09-13035	UCD	Cs	55	-----	-----	-----	0.003	0.070	0.331	-----
168-hr event	T09-13035	UCD	Ba	56	-----	-----	-----	0.000	0.038	0.099	-----
168-hr event	T09-13035	UCD	Ce	58	-----	-----	-----	0.000	0.032	0.066	-----
168-hr event	T09-13035	UCD	Pb	82	0.070	0.011	0.002	0.104	0.033	0.047	-----
152-hr event	T09-13042	CARB	Na	11	-----	-----	-----	5.594	0.490	0.386	-----
152-hr event	T09-13042	CARB	Mg	12	-----	-----	-----	0.560	0.073	0.110	-----
152-hr event	T09-13042	CARB	Al	13	1.850	0.211	0.200	2.034	0.201	0.122	1.850
152-hr event	T09-13042	CARB	Si	14	5.010	0.277	0.060	4.772	0.328	0.108	4.852
152-hr event	T09-13042	CARB	P	15	0.160	0.064	0.040	0.000	0.078	0.098	-----
152-hr event	T09-13042	CARB	S	16	46.090	2.312	0.050	42.228	2.120	0.071	43.584
152-hr event	T09-13042	CARB	Cl	17	0.270	0.040	0.060	0.375	0.035	0.048	-----
152-hr event	T09-13042	CARB	K	19	2.620	0.134	0.070	2.370	0.121	0.038	2.367
152-hr event	T09-13042	CARB	Ca	20	1.460	0.078	0.060	1.331	0.069	0.046	1.400
152-hr event	T09-13042	CARB	Ti	22	0.160	0.025	0.040	0.125	0.021	0.042	-----
152-hr event	T09-13042	CARB	V	23	<0.03	-----	0.030	0.008	0.014	0.029	-----
152-hr event	T09-13042	CARB	Cr	24	<0.03	-----	0.030	0.000	0.007	0.021	-----
152-hr event	T09-13042	CARB	Mn	25	0.130	0.011	0.030	0.120	0.011	0.017	-----
152-hr event	T09-13042	CARB	Fe	26	2.490	0.129	0.040	2.463	0.125	0.014	2.520
152-hr event	T09-13042	CARB	Co	27	<0.03	-----	0.030	0.009	0.007	0.011	-----
152-hr event	T09-13042	CARB	Ni	28	<0.03	-----	0.030	0.010	0.004	0.011	-----
152-hr event	T09-13042	CARB	Cu	29	0.060	0.016	0.040	0.056	0.007	0.013	-----
152-hr event	T09-13042	CARB	Zn	30	0.710	0.049	0.020	0.675	0.036	0.034	0.682
152-hr event	T09-13042	CARB	As	33	0.030	0.014	0.020	0.023	0.016	0.016	-----
152-hr event	T09-13042	CARB	Se	34	0.030	0.007	0.020	0.021	0.011	0.019	-----
152-hr event	T09-13042	CARB	Br	35	0.130	0.012	0.020	0.131	0.017	0.017	0.133

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	
152-hr event	T09-13042	CARB	Rb	37	<0.02	-----	0.020	0.000	0.005	0.017	-----
152-hr event	T09-13042	CARB	Sr	38	<0.03	-----	0.030	0.008	0.014	0.022	-----
152-hr event	T09-13042	CARB	Zr	40	-----	-----	-----	0.000	0.081	0.044	-----
152-hr event	T09-13042	CARB	Ag	47	-----	-----	-----	0.000	0.045	0.142	-----
152-hr event	T09-13042	CARB	Cd	48	-----	-----	-----	0.000	0.047	0.180	-----
152-hr event	T09-13042	CARB	In	49	-----	-----	-----	0.000	0.050	0.213	-----
152-hr event	T09-13042	CARB	Sn	50	<0.2	-----	0.200	0.000	0.088	0.307	-----
152-hr event	T09-13042	CARB	Sb	51	<0.2	-----	0.200	0.000	0.104	0.403	-----
152-hr event	T09-13042	CARB	Cs	55	-----	-----	-----	0.000	0.030	0.331	-----
152-hr event	T09-13042	CARB	Ba	56	0.210	0.059	0.200	0.000	0.038	0.099	-----
152-hr event	T09-13042	CARB	Ce	58	-----	-----	-----	0.000	0.032	0.066	-----
152-hr event	T09-13042	CARB	Pb	82	0.100	0.021	0.030	0.102	0.029	0.047	-----
152-hr event	T09-13043	CARB	Na	11	-----	-----	-----	5.379	0.473	0.386	-----
152-hr event	T09-13043	CARB	Mg	12	-----	-----	-----	0.704	0.078	0.110	-----
152-hr event	T09-13043	CARB	Al	13	1.800	0.210	0.200	1.695	0.186	0.122	1.850
152-hr event	T09-13043	CARB	Si	14	4.730	0.263	0.060	4.697	0.323	0.108	4.852
152-hr event	T09-13043	CARB	P	15	0.170	0.061	0.040	0.040	0.083	0.098	-----
152-hr event	T09-13043	CARB	S	16	41.020	2.058	0.050	38.759	1.946	0.071	43.584
152-hr event	T09-13043	CARB	Cl	17	0.240	0.036	0.060	0.339	0.034	0.048	-----
152-hr event	T09-13043	CARB	K	19	2.450	0.127	0.070	2.265	0.116	0.038	2.367
152-hr event	T09-13043	CARB	Ca	20	1.400	0.075	0.060	1.328	0.069	0.046	1.400
152-hr event	T09-13043	CARB	Ti	22	0.150	0.025	0.040	0.174	0.023	0.042	-----
152-hr event	T09-13043	CARB	V	23	0.030	0.015	0.030	0.000	0.013	0.029	-----
152-hr event	T09-13043	CARB	Cr	24	<0.03	-----	0.030	0.009	0.009	0.021	-----
152-hr event	T09-13043	CARB	Mn	25	0.120	0.011	0.030	0.102	0.010	0.017	-----
152-hr event	T09-13043	CARB	Fe	26	2.360	0.122	0.040	2.418	0.123	0.014	2.520
152-hr event	T09-13043	CARB	Co	27	<0.03	-----	0.030	0.010	0.007	0.011	-----
152-hr event	T09-13043	CARB	Ni	28	<0.03	-----	0.030	0.009	0.004	0.011	-----
152-hr event	T09-13043	CARB	Cu	29	0.060	0.016	0.040	0.044	0.007	0.013	-----
152-hr event	T09-13043	CARB	Zn	30	0.670	0.046	0.020	0.646	0.034	0.034	0.682
152-hr event	T09-13043	CARB	As	33	0.040	0.012	0.020	0.042	0.016	0.016	-----
152-hr event	T09-13043	CARB	Se	34	0.020	0.008	0.020	0.017	0.011	0.019	-----
152-hr event	T09-13043	CARB	Br	35	0.130	0.012	0.020	0.167	0.017	0.017	0.133
152-hr event	T09-13043	CARB	Rb	37	<0.02	-----	0.020	0.000	0.005	0.017	-----
152-hr event	T09-13043	CARB	Sr	38	<0.03	-----	0.030	0.000	0.006	0.022	-----
152-hr event	T09-13043	CARB	Zr	40	-----	-----	-----	0.000	0.081	0.044	-----
152-hr event	T09-13043	CARB	Ag	47	-----	-----	-----	0.000	0.045	0.142	-----
152-hr event	T09-13043	CARB	Cd	48	-----	-----	-----	0.000	0.047	0.180	-----
152-hr event	T09-13043	CARB	In	49	-----	-----	-----	0.000	0.050	0.213	-----
152-hr event	T09-13043	CARB	Sn	50	<0.2	-----	0.200	0.000	0.088	0.307	-----
152-hr event	T09-13043	CARB	Sb	51	<0.2	-----	0.200	0.260	0.452	0.403	-----
152-hr event	T09-13043	CARB	Cs	55	-----	-----	-----	0.000	0.041	0.331	-----
152-hr event	T09-13043	CARB	Ba	56	<0.2	-----	0.200	0.000	0.038	0.099	-----
152-hr event	T09-13043	CARB	Ce	58	-----	-----	-----	0.000	0.023	0.066	-----

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	
152-hr event	T09-13043	CARB	Pb	82	0.080	0.023	0.030	0.002	0.029	0.047	-----
152-hr event	T09-13044	DRI	Na	11	18.579	2.163	0.911	5.108	0.453	0.386	-----
152-hr event	T09-13044	DRI	Mg	12	0.278	0.514	0.346	0.662	0.076	0.110	-----
152-hr event	T09-13044	DRI	Al	13	1.720	0.109	0.079	1.593	0.182	0.122	1.850
152-hr event	T09-13044	DRI	Si	14	4.036	0.076	0.092	4.518	0.312	0.108	4.852
152-hr event	T09-13044	DRI	P	15	0.000	0.017	0.027	0.000	0.078	0.098	-----
152-hr event	T09-13044	DRI	S	16	44.451	0.168	0.075	40.002	2.008	0.071	43.584
152-hr event	T09-13044	DRI	Cl	17	0.110	0.017	0.019	0.363	0.035	0.048	-----
152-hr event	T09-13044	DRI	K	19	2.371	0.026	0.017	2.235	0.114	0.038	2.367
152-hr event	T09-13044	DRI	Ca	20	1.514	0.071	0.021	1.325	0.069	0.046	1.400
152-hr event	T09-13044	DRI	Ti	22	0.190	0.025	0.013	0.130	0.024	0.042	-----
152-hr event	T09-13044	DRI	V	23	0.000	0.017	0.001	0.000	0.013	0.029	-----
152-hr event	T09-13044	DRI	Cr	24	0.009	0.017	0.012	0.008	0.010	0.021	-----
152-hr event	T09-13044	DRI	Mn	25	0.037	0.051	0.024	0.099	0.010	0.017	-----
152-hr event	T09-13044	DRI	Fe	26	2.530	0.021	0.031	2.298	0.117	0.014	2.520
152-hr event	T09-13044	DRI	Co	27	0.000	0.017	0.001	0.019	0.008	0.011	-----
152-hr event	T09-13044	DRI	Ni	28	0.000	0.048	0.006	0.013	0.005	0.011	-----
152-hr event	T09-13044	DRI	Cu	29	0.075	0.060	0.010	0.046	0.008	0.013	-----
152-hr event	T09-13044	DRI	Zn	30	0.734	0.018	0.010	0.667	0.036	0.034	0.682
152-hr event	T09-13044	DRI	As	33	0.000	0.017	0.001	0.001	0.017	0.016	-----
152-hr event	T09-13044	DRI	Se	34	0.000	0.017	0.024	0.025	0.012	0.019	-----
152-hr event	T09-13044	DRI	Br	35	0.062	0.017	0.017	0.131	0.017	0.017	0.133
152-hr event	T09-13044	DRI	Rb	37	0.021	0.017	0.013	0.000	0.005	0.017	-----
152-hr event	T09-13044	DRI	Sr	38	0.051	0.017	0.023	0.001	0.015	0.022	-----
152-hr event	T09-13044	DRI	Zr	40	0.000	0.027	0.041	0.000	0.081	0.044	-----
152-hr event	T09-13044	DRI	Ag	47	0.000	0.038	0.049	0.000	0.045	0.142	-----
152-hr event	T09-13044	DRI	Cd	48	0.003	0.049	0.060	0.000	0.047	0.180	-----
152-hr event	T09-13044	DRI	In	49	0.000	0.051	0.036	0.090	0.249	0.213	-----
152-hr event	T09-13044	DRI	Sn	50	0.013	0.051	0.045	0.000	0.088	0.307	-----
152-hr event	T09-13044	DRI	Sb	51	0.041	0.081	0.084	0.305	0.475	0.403	-----
152-hr event	T09-13044	DRI	Cs	55	0.000	0.166	0.014	0.000	0.041	0.331	-----
152-hr event	T09-13044	DRI	Ba	56	0.000	0.192	0.007	0.000	0.046	0.099	-----
152-hr event	T09-13044	DRI	Ce	58	0.048	0.227	0.015	0.000	0.032	0.066	-----
152-hr event	T09-13044	DRI	Pb	82	0.038	0.018	0.030	0.124	0.030	0.047	-----
152-hr event	T09-13045	DRI	Na	11	6.196	1.798	0.911	4.723	0.423	0.386	-----
152-hr event	T09-13045	DRI	Mg	12	0.000	0.511	0.346	0.394	0.067	0.110	-----
152-hr event	T09-13045	DRI	Al	13	1.671	0.108	0.079	1.955	0.197	0.122	1.850
152-hr event	T09-13045	DRI	Si	14	3.856	0.075	0.092	4.343	0.301	0.108	4.852
152-hr event	T09-13045	DRI	P	15	0.000	0.017	0.027	0.000	0.078	0.098	-----
152-hr event	T09-13045	DRI	S	16	46.875	0.176	0.075	39.516	1.984	0.071	43.584
152-hr event	T09-13045	DRI	Cl	17	0.092	0.017	0.019	0.304	0.033	0.048	-----
152-hr event	T09-13045	DRI	K	19	2.458	0.026	0.017	2.229	0.114	0.038	2.367
152-hr event	T09-13045	DRI	Ca	20	1.391	0.071	0.021	1.287	0.068	0.046	1.400
152-hr event	T09-13045	DRI	Ti	22	0.171	0.025	0.013	0.136	0.023	0.042	-----

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	
152-hr event	T09-13045	DRI	V	23	0.006	0.017	0.001	0.000	0.013	0.029	-----
152-hr event	T09-13045	DRI	Cr	24	0.012	0.017	0.012	0.004	0.009	0.021	-----
152-hr event	T09-13045	DRI	Mn	25	0.059	0.051	0.024	0.111	0.012	0.017	-----
152-hr event	T09-13045	DRI	Fe	26	2.597	0.021	0.031	2.285	0.116	0.014	2.520
152-hr event	T09-13045	DRI	Co	27	0.001	0.017	0.001	0.021	0.008	0.011	-----
152-hr event	T09-13045	DRI	Ni	28	0.000	0.048	0.006	0.012	0.004	0.011	-----
152-hr event	T09-13045	DRI	Cu	29	0.050	0.060	0.010	0.057	0.008	0.013	-----
152-hr event	T09-13045	DRI	Zn	30	0.739	0.018	0.010	0.632	0.034	0.034	0.682
152-hr event	T09-13045	DRI	As	33	0.000	0.017	0.001	0.012	0.016	0.016	-----
152-hr event	T09-13045	DRI	Se	34	0.000	0.017	0.024	0.006	0.011	0.019	-----
152-hr event	T09-13045	DRI	Br	35	0.133	0.017	0.017	0.133	0.016	0.017	0.133
152-hr event	T09-13045	DRI	Rb	37	0.010	0.017	0.013	0.000	0.005	0.017	-----
152-hr event	T09-13045	DRI	Sr	38	0.031	0.017	0.023	0.001	0.014	0.022	-----
152-hr event	T09-13045	DRI	Zr	40	0.019	0.028	0.041	0.000	0.081	0.044	-----
152-hr event	T09-13045	DRI	Ag	47	0.024	0.038	0.049	0.000	0.045	0.142	-----
152-hr event	T09-13045	DRI	Cd	48	0.000	0.048	0.060	0.011	0.181	0.180	-----
152-hr event	T09-13045	DRI	In	49	0.018	0.051	0.036	0.000	0.050	0.213	-----
152-hr event	T09-13045	DRI	Sn	50	0.063	0.051	0.045	0.000	0.088	0.307	-----
152-hr event	T09-13045	DRI	Sb	51	0.038	0.081	0.084	0.011	0.441	0.403	-----
152-hr event	T09-13045	DRI	Cs	55	0.000	0.166	0.014	0.000	0.041	0.331	-----
152-hr event	T09-13045	DRI	Ba	56	0.000	0.192	0.007	0.000	0.038	0.099	-----
152-hr event	T09-13045	DRI	Ce	58	0.000	0.227	0.015	0.000	0.032	0.066	-----
152-hr event	T09-13045	DRI	Pb	82	0.132	0.019	0.030	0.089	0.029	0.047	-----
152-hr event	T09-13046	ODEQ	Na	11	-----	-----	-----	4.870	0.435	0.386	-----
152-hr event	T09-13046	ODEQ	Mg	12	-----	-----	-----	0.411	0.069	0.110	-----
152-hr event	T09-13046	ODEQ	Al	13	1.700	0.165	0.280	1.831	0.192	0.122	1.850
152-hr event	T09-13046	ODEQ	Si	14	5.520	0.484	0.590	4.648	0.321	0.108	4.852
152-hr event	T09-13046	ODEQ	P	15	<0.42	0.144	0.420	0.000	0.081	0.098	-----
152-hr event	T09-13046	ODEQ	S	16	50.300	4.044	1.300	43.675	2.192	0.071	43.584
152-hr event	T09-13046	ODEQ	Cl	17	<1.0	0.353	1.000	0.327	0.035	0.048	-----
152-hr event	T09-13046	ODEQ	K	19	2.460	0.202	0.130	2.417	0.123	0.038	2.367
152-hr event	T09-13046	ODEQ	Ca	20	1.570	0.138	0.170	1.332	0.070	0.046	1.400
152-hr event	T09-13046	ODEQ	Ti	22	0.170	0.049	0.140	0.118	0.022	0.042	-----
152-hr event	T09-13046	ODEQ	V	23	<0.050	0.017	0.050	0.000	0.013	0.029	-----
152-hr event	T09-13046	ODEQ	Cr	24	<0.032	0.011	0.032	0.008	0.008	0.021	-----
152-hr event	T09-13046	ODEQ	Mn	25	0.111	0.017	0.043	0.121	0.011	0.017	-----
152-hr event	T09-13046	ODEQ	Fe	26	2.390	0.193	0.080	2.503	0.127	0.014	2.520
152-hr event	T09-13046	ODEQ	Co	27	<0.049	0.016	0.049	0.021	0.008	0.011	-----
152-hr event	T09-13046	ODEQ	Ni	28	<0.023	0.008	0.023	0.004	0.004	0.011	-----
152-hr event	T09-13046	ODEQ	Cu	29	<0.10 est	0.035	0.100	0.067	0.008	0.013	-----
152-hr event	T09-13046	ODEQ	Zn	30	0.740	0.060	0.036	0.673	0.036	0.034	0.682
152-hr event	T09-13046	ODEQ	As	33	<0.034	0.012	0.034	0.043	0.017	0.016	-----
152-hr event	T09-13046	ODEQ	Se	34	<0.031	0.010	0.031	0.028	0.011	0.019	-----
152-hr event	T09-13046	ODEQ	Br	35	0.124	0.014	0.030	0.158	0.018	0.017	0.133

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	
152-hr event	T09-13046	ODEQ	Rb	37	<0.027	0.009	0.027	0.000	0.005	0.017	-----
152-hr event	T09-13046	ODEQ	Sr	38	<0.023	0.008	0.023	0.012	0.014	0.022	-----
152-hr event	T09-13046	ODEQ	Zr	40	<0.034	0.011	0.034	0.000	0.081	0.044	-----
152-hr event	T09-13046	ODEQ	Ag	47	<0.094	0.031	0.094	0.000	0.045	0.142	-----
152-hr event	T09-13046	ODEQ	Cd	48	<0.097	0.032	0.097	0.000	0.047	0.180	-----
152-hr event	T09-13046	ODEQ	In	49	<0.11	0.035	0.110	0.000	0.069	0.213	-----
152-hr event	T09-13046	ODEQ	Sn	50	<0.16	0.054	0.160	0.170	0.328	0.307	-----
152-hr event	T09-13046	ODEQ	Sb	51	<0.15	0.051	0.150	0.000	0.104	0.403	-----
152-hr event	T09-13046	ODEQ	Cs	55	<0.25	0.084	0.250	0.000	0.041	0.331	-----
152-hr event	T09-13046	ODEQ	Ba	56	<0.36	0.119	0.360	0.000	0.038	0.099	-----
152-hr event	T09-13046	ODEQ	Ce	58	<0.63	0.211	0.630	0.000	0.032	0.066	-----
152-hr event	T09-13046	ODEQ	Pb	82	0.100	0.025	0.072	0.080	0.031	0.047	-----
152-hr event	T09-13047	ODEQ	Na	11	-----	-----	-----	5.368	0.472	0.386	-----
152-hr event	T09-13047	ODEQ	Mg	12	-----	-----	-----	0.764	0.081	0.110	-----
152-hr event	T09-13047	ODEQ	Al	13	1.690	0.164	0.280	1.887	0.194	0.122	1.850
152-hr event	T09-13047	ODEQ	Si	14	5.270	0.462	0.570	4.657	0.322	0.108	4.852
152-hr event	T09-13047	ODEQ	P	15	<0.40	0.136	0.400	0.000	0.078	0.098	-----
152-hr event	T09-13047	ODEQ	S	16	47.300	3.808	1.200	41.471	2.082	0.071	43.584
152-hr event	T09-13047	ODEQ	Cl	17	<0.99	0.332	0.990	0.324	0.034	0.048	-----
152-hr event	T09-13047	ODEQ	K	19	2.240	0.184	0.120	2.331	0.119	0.038	2.367
152-hr event	T09-13047	ODEQ	Ca	20	1.450	0.129	0.170	1.232	0.065	0.046	1.400
152-hr event	T09-13047	ODEQ	Ti	22	<0.14	0.048	0.140	0.128	0.018	0.042	-----
152-hr event	T09-13047	ODEQ	V	23	<0.050	0.017	0.050	0.005	0.012	0.029	-----
152-hr event	T09-13047	ODEQ	Cr	24	<0.032	0.011	0.032	0.013	0.009	0.021	-----
152-hr event	T09-13047	ODEQ	Mn	25	0.124	0.018	0.043	0.116	0.011	0.017	-----
152-hr event	T09-13047	ODEQ	Fe	26	2.260	0.183	0.077	2.399	0.122	0.014	2.520
152-hr event	T09-13047	ODEQ	Co	27	<0.048	0.016	0.048	0.011	0.008	0.011	-----
152-hr event	T09-13047	ODEQ	Ni	28	<0.023	0.008	0.023	0.009	0.004	0.011	-----
152-hr event	T09-13047	ODEQ	Cu	29	<0.10 est	0.035	0.100	0.051	0.008	0.013	-----
152-hr event	T09-13047	ODEQ	Zn	30	0.668	0.055	0.034	0.626	0.033	0.034	0.682
152-hr event	T09-13047	ODEQ	As	33	<0.033	0.011	0.033	0.024	0.016	0.016	-----
152-hr event	T09-13047	ODEQ	Se	34	<0.030	0.010	0.030	0.021	0.011	0.019	-----
152-hr event	T09-13047	ODEQ	Br	35	0.129	0.014	0.030	0.125	0.017	0.017	0.133
152-hr event	T09-13047	ODEQ	Rb	37	<0.027	0.009	0.027	0.000	0.005	0.017	-----
152-hr event	T09-13047	ODEQ	Sr	38	<0.022	0.008	0.022	0.012	0.014	0.022	-----
152-hr event	T09-13047	ODEQ	Zr	40	<0.034	0.011	0.034	0.000	0.081	0.044	-----
152-hr event	T09-13047	ODEQ	Ag	47	<0.093	0.031	0.093	0.000	0.045	0.142	-----
152-hr event	T09-13047	ODEQ	Cd	48	<0.096	0.032	0.096	0.000	0.047	0.180	-----
152-hr event	T09-13047	ODEQ	In	49	<0.11	0.035	0.110	0.000	0.050	0.213	-----
152-hr event	T09-13047	ODEQ	Sn	50	<0.16	0.053	0.160	0.000	0.088	0.307	-----
152-hr event	T09-13047	ODEQ	Sb	51	<0.15	0.051	0.150	0.000	0.104	0.403	-----
152-hr event	T09-13047	ODEQ	Cs	55	<0.25	0.083	0.250	0.000	0.041	0.331	-----
152-hr event	T09-13047	ODEQ	Ba	56	<0.35	0.119	0.350	0.000	0.046	0.099	-----
152-hr event	T09-13047	ODEQ	Ce	58	<0.63	0.211	0.630	0.000	0.032	0.066	-----

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	
152-hr event	T09-13047	ODEQ	Pb	82	0.098	0.025	0.071	0.060	0.028	0.047	-----
152-hr event	T09-13048	AQMD	Na	11	-----	-----	-----	5.469	0.484	0.386	-----
152-hr event	T09-13048	AQMD	Mg	12	ND	-----	1.680	0.608	0.076	0.110	-----
152-hr event	T09-13048	AQMD	Al	13	3.751	0.925	1.200	1.989	0.207	0.122	1.850
152-hr event	T09-13048	AQMD	Si	14	7.278	1.930	2.600	4.860	0.335	0.108	4.852
152-hr event	T09-13048	AQMD	P	15	ND	-----	1.585	0.000	0.081	0.098	-----
152-hr event	T09-13048	AQMD	S	16	42.097	3.771	0.251	43.143	2.166	0.071	43.584
152-hr event	T09-13048	AQMD	Cl	17	0.203	0.105	0.174	0.438	0.038	0.048	-----
152-hr event	T09-13048	AQMD	K	19	1.962	0.200	0.061	2.450	0.125	0.038	2.367
152-hr event	T09-13048	AQMD	Ca	20	1.690	0.180	0.067	1.440	0.075	0.046	1.400
152-hr event	T09-13048	AQMD	Ti	22	0.151	0.044	0.061	0.147	0.024	0.042	-----
152-hr event	T09-13048	AQMD	V	23	ND	-----	0.070	0.000	0.013	0.029	-----
152-hr event	T09-13048	AQMD	Cr	24	ND	-----	0.060	0.006	0.009	0.021	-----
152-hr event	T09-13048	AQMD	Mn	25	0.353	0.066	0.070	0.128	0.011	0.017	-----
152-hr event	T09-13048	AQMD	Fe	26	2.640	0.246	0.035	2.567	0.130	0.014	2.520
152-hr event	T09-13048	AQMD	Co	27	ND	-----	0.020	0.028	0.008	0.011	-----
152-hr event	T09-13048	AQMD	Ni	28	ND	-----	0.013	0.012	0.005	0.011	-----
152-hr event	T09-13048	AQMD	Cu	29	0.041	0.012	0.018	0.058	0.008	0.013	-----
152-hr event	T09-13048	AQMD	Zn	30	0.762	0.076	0.021	0.703	0.037	0.034	0.682
152-hr event	T09-13048	AQMD	As	33	ND	-----	0.130	0.045	0.017	0.016	-----
152-hr event	T09-13048	AQMD	Se	34	ND	-----	0.070	0.038	0.013	0.019	-----
152-hr event	T09-13048	AQMD	Br	35	0.139	0.021	0.019	0.130	0.018	0.017	0.133
152-hr event	T09-13048	AQMD	Rb	37	ND	-----	0.070	0.000	0.005	0.017	-----
152-hr event	T09-13048	AQMD	Sr	38	ND	-----	0.030	0.003	0.014	0.022	-----
152-hr event	T09-13048	AQMD	Zr	40	-----	-----	-----	0.000	0.081	0.044	-----
152-hr event	T09-13048	AQMD	Ag	47	ND	-----	0.180	0.000	0.045	0.142	-----
152-hr event	T09-13048	AQMD	Cd	48	ND	-----	0.210	0.011	0.181	0.180	-----
152-hr event	T09-13048	AQMD	In	49	ND	-----	0.030	0.000	0.069	0.213	-----
152-hr event	T09-13048	AQMD	Sn	50	0.127	0.016	0.010	0.000	0.088	0.307	-----
152-hr event	T09-13048	AQMD	Sb	51	ND	-----	0.530	0.000	0.104	0.403	-----
152-hr event	T09-13048	AQMD	Cs	55	ND	-----	0.070	0.000	0.041	0.331	-----
152-hr event	T09-13048	AQMD	Ba	56	ND	-----	0.290	0.000	0.046	0.099	-----
152-hr event	T09-13048	AQMD	Ce	58	-----	-----	-----	0.000	0.032	0.066	-----
152-hr event	T09-13048	AQMD	Pb	82	0.200	0.107	0.180	0.070	0.031	0.047	-----
152-hr event	T09-13049	AQMD	Na	11	-----	-----	-----	4.723	0.423	0.386	-----
152-hr event	T09-13049	AQMD	Mg	12	ND	-----	1.680	0.498	0.070	0.110	-----
152-hr event	T09-13049	AQMD	Al	13	3.253	0.882	1.200	1.571	0.181	0.122	1.850
152-hr event	T09-13049	AQMD	Si	14	6.558	1.868	2.600	4.502	0.311	0.108	4.852
152-hr event	T09-13049	AQMD	P	15	ND	-----	1.585	0.000	0.078	0.098	-----
152-hr event	T09-13049	AQMD	S	16	40.993	3.676	0.251	40.624	2.039	0.071	43.584
152-hr event	T09-13049	AQMD	Cl	17	ND	-----	0.174	0.327	0.034	0.048	-----
152-hr event	T09-13049	AQMD	K	19	1.734	0.181	0.061	2.179	0.112	0.038	2.367
152-hr event	T09-13049	AQMD	Ca	20	1.390	0.154	0.067	1.231	0.064	0.046	1.400
152-hr event	T09-13049	AQMD	Ti	22	0.139	0.043	0.061	0.084	0.021	0.042	-----

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	
152-hr event	T09-13049	AQMD	V	23	ND	-----	0.070	0.000	0.009	0.029	-----
152-hr event	T09-13049	AQMD	Cr	24	ND	-----	0.060	0.009	0.009	0.021	-----
152-hr event	T09-13049	AQMD	Mn	25	0.119	0.045	0.070	0.106	0.010	0.017	-----
152-hr event	T09-13049	AQMD	Fe	26	2.298	0.217	0.035	2.287	0.116	0.014	2.520
152-hr event	T09-13049	AQMD	Co	27	ND	-----	0.020	0.013	0.007	0.011	-----
152-hr event	T09-13049	AQMD	Ni	28	ND	-----	0.013	0.006	0.004	0.011	-----
152-hr event	T09-13049	AQMD	Cu	29	0.041	0.012	0.018	0.045	0.008	0.013	-----
152-hr event	T09-13049	AQMD	Zn	30	0.648	0.067	0.021	0.635	0.034	0.034	0.682
152-hr event	T09-13049	AQMD	As	33	ND	-----	0.130	0.000	0.006	0.016	-----
152-hr event	T09-13049	AQMD	Se	34	ND	-----	0.070	0.006	0.011	0.019	-----
152-hr event	T09-13049	AQMD	Br	35	0.145	0.022	0.019	0.132	0.016	0.017	0.133
152-hr event	T09-13049	AQMD	Rb	37	ND	-----	0.070	0.000	0.005	0.017	-----
152-hr event	T09-13049	AQMD	Sr	38	ND	-----	0.030	0.000	0.006	0.022	-----
152-hr event	T09-13049	AQMD	Zr	40	-----	-----	-----	0.000	0.081	0.044	-----
152-hr event	T09-13049	AQMD	Ag	47	ND	-----	0.180	0.000	0.045	0.142	-----
152-hr event	T09-13049	AQMD	Cd	48	ND	-----	0.210	0.000	0.047	0.180	-----
152-hr event	T09-13049	AQMD	In	49	ND	-----	0.030	0.000	0.050	0.213	-----
152-hr event	T09-13049	AQMD	Sn	50	0.067	0.011	0.010	0.000	0.088	0.307	-----
152-hr event	T09-13049	AQMD	Sb	51	ND	-----	0.530	0.000	0.104	0.403	-----
152-hr event	T09-13049	AQMD	Cs	55	ND	-----	0.070	0.000	0.030	0.331	-----
152-hr event	T09-13049	AQMD	Ba	56	ND	-----	0.290	0.003	0.057	0.099	-----
152-hr event	T09-13049	AQMD	Ce	58	-----	-----	-----	0.000	0.032	0.066	-----
152-hr event	T09-13049	AQMD	Pb	82	ND	-----	0.180	0.120	0.030	0.047	-----
152-hr event	T09-13050	UCD	Na	11	10.411	1.651	0.517	5.774	0.504	0.386	-----
152-hr event	T09-13050	UCD	Mg	12	0.000	0.000	0.175	0.643	0.076	0.110	-----
152-hr event	T09-13050	UCD	Al	13	2.716	0.318	0.087	1.808	0.191	0.122	1.850
152-hr event	T09-13050	UCD	Si	14	7.085	0.420	0.048	4.852	0.334	0.108	4.852
152-hr event	T09-13050	UCD	P	15	0.000	0.000	0.029	0.000	0.078	0.098	-----
152-hr event	T09-13050	UCD	S	16	41.895	2.114	0.018	43.788	2.198	0.071	43.584
152-hr event	T09-13050	UCD	Cl	17	0.000	0.000	0.011	0.323	0.034	0.048	-----
152-hr event	T09-13050	UCD	K	19	2.249	0.120	0.006	2.380	0.122	0.038	2.367
152-hr event	T09-13050	UCD	Ca	20	1.452	0.078	0.003	1.399	0.073	0.046	1.400
152-hr event	T09-13050	UCD	Ti	22	0.170	0.012	0.002	0.127	0.021	0.042	-----
152-hr event	T09-13050	UCD	V	23	0.019	0.004	0.001	0.000	0.009	0.029	-----
152-hr event	T09-13050	UCD	Cr	24	0.014	0.003	0.001	0.000	0.007	0.021	-----
152-hr event	T09-13050	UCD	Mn	25	0.117	0.008	0.001	0.139	0.011	0.017	-----
152-hr event	T09-13050	UCD	Fe	26	2.520	0.129	0.002	2.579	0.131	0.014	2.520
152-hr event	T09-13050	UCD	Co	27	-----	-----	-----	0.008	0.007	0.011	-----
152-hr event	T09-13050	UCD	Ni	28	0.000	0.000	0.001	0.006	0.004	0.011	-----
152-hr event	T09-13050	UCD	Cu	29	0.047	0.004	0.001	0.048	0.008	0.013	-----
152-hr event	T09-13050	UCD	Zn	30	0.706	0.037	0.001	0.715	0.038	0.034	0.682
152-hr event	T09-13050	UCD	As	33	0.030	0.007	0.004	0.036	0.016	0.016	-----
152-hr event	T09-13050	UCD	Se	34	0.024	0.003	0.001	0.023	0.011	0.019	-----
152-hr event	T09-13050	UCD	Br	35	0.144	0.009	0.001	0.150	0.017	0.017	0.133

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	
152-hr event	T09-13050	UCD	Rb	37	0.000	0.000	0.002	0.000	0.005	0.017	-----
152-hr event	T09-13050	UCD	Sr	38	0.017	0.005	0.003	0.029	0.014	0.022	-----
152-hr event	T09-13050	UCD	Zr	40	0.000	0.000	0.005	0.000	0.081	0.044	-----
152-hr event	T09-13050	UCD	Ag	47	-----	-----	-----	0.000	0.045	0.142	-----
152-hr event	T09-13050	UCD	Cd	48	-----	-----	-----	0.000	0.047	0.180	-----
152-hr event	T09-13050	UCD	In	49	-----	-----	-----	0.000	0.050	0.213	-----
152-hr event	T09-13050	UCD	Sn	50	-----	-----	-----	0.000	0.088	0.307	-----
152-hr event	T09-13050	UCD	Sb	51	-----	-----	-----	0.000	0.104	0.403	-----
152-hr event	T09-13050	UCD	Cs	55	-----	-----	-----	0.000	0.030	0.331	-----
152-hr event	T09-13050	UCD	Ba	56	-----	-----	-----	0.000	0.038	0.099	-----
152-hr event	T09-13050	UCD	Ce	58	-----	-----	-----	0.000	0.032	0.066	-----
152-hr event	T09-13050	UCD	Pb	82	0.107	0.011	0.001	0.051	0.028	0.047	-----
152-hr event	T09-13051	UCD	Na	11	11.837	1.554	0.531	5.221	0.461	0.386	-----
152-hr event	T09-13051	UCD	Mg	12	1.231	0.307	0.177	0.562	0.073	0.110	-----
152-hr event	T09-13051	UCD	Al	13	2.468	0.249	0.089	1.672	0.185	0.122	1.850
152-hr event	T09-13051	UCD	Si	14	7.328	0.426	0.048	4.311	0.300	0.108	4.852
152-hr event	T09-13051	UCD	P	15	0.000	0.000	0.030	0.000	0.081	0.098	-----
152-hr event	T09-13051	UCD	S	16	44.716	2.255	0.019	43.584	2.188	0.071	43.584
152-hr event	T09-13051	UCD	Cl	17	0.000	0.000	0.012	0.260	0.032	0.048	-----
152-hr event	T09-13051	UCD	K	19	2.252	0.120	0.006	2.367	0.121	0.038	2.367
152-hr event	T09-13051	UCD	Ca	20	1.447	0.079	0.003	1.309	0.068	0.046	1.400
152-hr event	T09-13051	UCD	Ti	22	0.157	0.011	0.002	0.132	0.022	0.042	-----
152-hr event	T09-13051	UCD	V	23	0.020	0.005	0.001	0.000	0.009	0.029	-----
152-hr event	T09-13051	UCD	Cr	24	0.011	0.002	0.001	0.000	0.007	0.021	-----
152-hr event	T09-13051	UCD	Mn	25	0.129	0.009	0.001	0.132	0.011	0.017	-----
152-hr event	T09-13051	UCD	Fe	26	2.536	0.129	0.002	2.401	0.122	0.014	2.520
152-hr event	T09-13051	UCD	Co	27	-----	-----	-----	0.017	0.007	0.011	-----
152-hr event	T09-13051	UCD	Ni	28	0.000	0.000	0.002	0.008	0.004	0.011	-----
152-hr event	T09-13051	UCD	Cu	29	0.052	0.005	0.002	0.049	0.007	0.013	-----
152-hr event	T09-13051	UCD	Zn	30	0.700	0.037	0.001	0.659	0.035	0.034	0.682
152-hr event	T09-13051	UCD	As	33	0.026	0.007	0.004	0.012	0.016	0.016	-----
152-hr event	T09-13051	UCD	Se	34	0.027	0.003	0.001	0.031	0.011	0.019	-----
152-hr event	T09-13051	UCD	Br	35	0.146	0.009	0.001	0.155	0.018	0.017	0.133
152-hr event	T09-13051	UCD	Rb	37	0.013	0.008	0.002	0.000	0.005	0.017	-----
152-hr event	T09-13051	UCD	Sr	38	0.032	0.006	0.003	0.007	0.014	0.022	-----
152-hr event	T09-13051	UCD	Zr	40	0.058	0.012	0.006	0.000	0.081	0.044	-----
152-hr event	T09-13051	UCD	Ag	47	-----	-----	-----	0.000	0.045	0.142	-----
152-hr event	T09-13051	UCD	Cd	48	-----	-----	-----	0.000	0.047	0.180	-----
152-hr event	T09-13051	UCD	In	49	-----	-----	-----	0.000	0.050	0.213	-----
152-hr event	T09-13051	UCD	Sn	50	-----	-----	-----	0.023	0.305	0.307	-----
152-hr event	T09-13051	UCD	Sb	51	-----	-----	-----	0.000	0.104	0.403	-----
152-hr event	T09-13051	UCD	Cs	55	-----	-----	-----	0.002	0.058	0.331	-----
152-hr event	T09-13051	UCD	Ba	56	-----	-----	-----	0.000	0.038	0.099	-----
152-hr event	T09-13051	UCD	Ce	58	-----	-----	-----	0.000	0.032	0.066	-----

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	
152-hr event	T09-13051	UCD	Pb	82	0.107	0.012	0.002	0.090	0.029	0.047	-----
blank filter	T09-13056	CARB	Na	11	-----	-----	-----	0.000	0.088	0.386	-----
blank filter	T09-13056	CARB	Mg	12	-----	-----	-----	0.000	0.031	0.110	-----
blank filter	T09-13056	CARB	Al	13	<0.2	-----	0.200	0.000	0.082	0.122	-----
blank filter	T09-13056	CARB	Si	14	<0.06	-----	0.060	0.000	0.041	0.108	-----
blank filter	T09-13056	CARB	P	15	<0.04	-----	0.040	0.000	0.033	0.098	-----
blank filter	T09-13056	CARB	S	16	<0.05	-----	0.050	0.000	0.020	0.071	-----
blank filter	T09-13056	CARB	Cl	17	<0.06	-----	0.060	0.000	0.015	0.048	-----
blank filter	T09-13056	CARB	K	19	<0.07	-----	0.070	0.000	0.012	0.038	-----
blank filter	T09-13056	CARB	Ca	20	<0.06	-----	0.060	0.000	0.013	0.046	-----
blank filter	T09-13056	CARB	Ti	22	<0.04	-----	0.040	0.000	0.012	0.042	-----
blank filter	T09-13056	CARB	V	23	<0.03	-----	0.030	0.000	0.009	0.029	-----
blank filter	T09-13056	CARB	Cr	24	<0.03	-----	0.030	0.000	0.007	0.021	-----
blank filter	T09-13056	CARB	Mn	25	<0.03	-----	0.030	0.000	0.005	0.017	-----
blank filter	T09-13056	CARB	Fe	26	<0.04	-----	0.040	0.000	0.004	0.014	-----
blank filter	T09-13056	CARB	Co	27	<0.03	-----	0.030	0.001	0.004	0.011	-----
blank filter	T09-13056	CARB	Ni	28	<0.03	-----	0.030	0.000	0.003	0.011	-----
blank filter	T09-13056	CARB	Cu	29	<0.04	-----	0.040	0.000	0.003	0.013	-----
blank filter	T09-13056	CARB	Zn	30	<0.02	-----	0.020	0.000	0.004	0.034	-----
blank filter	T09-13056	CARB	As	33	<0.02	-----	0.020	0.000	0.006	0.016	-----
blank filter	T09-13056	CARB	Se	34	<0.02	-----	0.020	0.009	0.009	0.019	-----
blank filter	T09-13056	CARB	Br	35	<0.02	-----	0.020	0.000	0.006	0.017	-----
blank filter	T09-13056	CARB	Rb	37	<0.02	-----	0.020	0.000	0.005	0.017	-----
blank filter	T09-13056	CARB	Sr	38	<0.03	-----	0.030	0.000	0.005	0.022	-----
blank filter	T09-13056	CARB	Zr	40	-----	-----	-----	0.000	0.081	0.044	-----
blank filter	T09-13056	CARB	Ag	47	-----	-----	-----	0.000	0.045	0.142	-----
blank filter	T09-13056	CARB	Cd	48	-----	-----	-----	0.000	0.047	0.180	-----
blank filter	T09-13056	CARB	In	49	-----	-----	-----	0.090	0.226	0.213	-----
blank filter	T09-13056	CARB	Sn	50	<0.2	-----	0.200	0.000	0.088	0.307	-----
blank filter	T09-13056	CARB	Sb	51	<0.2	-----	0.200	0.000	0.086	0.403	-----
blank filter	T09-13056	CARB	Cs	55	-----	-----	-----	0.003	0.032	0.331	-----
blank filter	T09-13056	CARB	Ba	56	<0.2	-----	0.200	0.000	0.028	0.099	-----
blank filter	T09-13056	CARB	Ce	58	-----	-----	-----	0.000	0.023	0.066	-----
blank filter	T09-13056	CARB	Pb	82	<0.03	-----	0.030	0.000	0.016	0.047	-----
blank filter	T09-13057	CARB	Na	11	-----	-----	-----	0.012	0.090	0.386	-----
blank filter	T09-13057	CARB	Mg	12	-----	-----	-----	0.000	0.033	0.110	-----
blank filter	T09-13057	CARB	Al	13	<0.2	-----	0.200	0.000	0.082	0.122	-----
blank filter	T09-13057	CARB	Si	14	<0.06	-----	0.060	0.000	0.041	0.108	-----
blank filter	T09-13057	CARB	P	15	<0.04	-----	0.040	0.000	0.033	0.098	-----
blank filter	T09-13057	CARB	S	16	<0.05	-----	0.050	0.000	0.024	0.071	-----
blank filter	T09-13057	CARB	Cl	17	<0.06	-----	0.060	0.000	0.018	0.048	-----
blank filter	T09-13057	CARB	K	19	<0.07	-----	0.070	0.000	0.013	0.038	-----
blank filter	T09-13057	CARB	Ca	20	<0.06	-----	0.060	0.000	0.015	0.046	-----
blank filter	T09-13057	CARB	Ti	22	<0.04	-----	0.040	0.000	0.012	0.042	-----

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	T09-13057	CARB	V	23	<0.03	-----	0.030	0.000	0.009	0.029	-----
blank filter	T09-13057	CARB	Cr	24	<0.03	-----	0.030	0.000	0.007	0.021	-----
blank filter	T09-13057	CARB	Mn	25	<0.03	-----	0.030	0.000	0.005	0.017	-----
blank filter	T09-13057	CARB	Fe	26	<0.04	-----	0.040	0.000	0.004	0.014	-----
blank filter	T09-13057	CARB	Co	27	<0.03	-----	0.030	0.000	0.004	0.011	-----
blank filter	T09-13057	CARB	Ni	28	<0.03	-----	0.030	0.000	0.004	0.011	-----
blank filter	T09-13057	CARB	Cu	29	<0.04	-----	0.040	0.004	0.007	0.013	-----
blank filter	T09-13057	CARB	Zn	30	<0.02	-----	0.020	0.000	0.005	0.034	-----
blank filter	T09-13057	CARB	As	33	<0.02	-----	0.020	0.000	0.006	0.016	-----
blank filter	T09-13057	CARB	Se	34	<0.02	-----	0.020	0.000	0.006	0.019	-----
blank filter	T09-13057	CARB	Br	35	<0.02	-----	0.020	0.003	0.009	0.017	-----
blank filter	T09-13057	CARB	Rb	37	<0.02	-----	0.020	0.000	0.005	0.017	-----
blank filter	T09-13057	CARB	Sr	38	<0.03	-----	0.030	0.000	0.006	0.022	-----
blank filter	T09-13057	CARB	Zr	40	-----	-----	-----	0.000	0.081	0.044	-----
blank filter	T09-13057	CARB	Ag	47	-----	-----	-----	0.034	0.147	0.142	-----
blank filter	T09-13057	CARB	Cd	48	-----	-----	-----	0.000	0.047	0.180	-----
blank filter	T09-13057	CARB	In	49	-----	-----	-----	0.000	0.050	0.213	-----
blank filter	T09-13057	CARB	Sn	50	<0.2	-----	0.200	0.034	0.316	0.307	-----
blank filter	T09-13057	CARB	Sb	51	<0.2	-----	0.200	0.000	0.104	0.403	-----
blank filter	T09-13057	CARB	Cs	55	-----	-----	-----	0.000	0.030	0.331	-----
blank filter	T09-13057	CARB	Ba	56	<0.2	-----	0.200	0.000	0.028	0.099	-----
blank filter	T09-13057	CARB	Ce	58	-----	-----	-----	0.000	0.023	0.066	-----
blank filter	T09-13057	CARB	Pb	82	<0.03	-----	0.030	0.000	0.016	0.047	-----
blank filter	T09-13058	DRI	Na	11	0.000	1.597	0.911	0.000	0.094	0.386	-----
blank filter	T09-13058	DRI	Mg	12	0.000	0.504	0.346	0.000	0.033	0.110	-----
blank filter	T09-13058	DRI	Al	13	0.308	0.103	0.079	0.000	0.082	0.122	-----
blank filter	T09-13058	DRI	Si	14	0.006	0.062	0.092	0.000	0.041	0.108	-----
blank filter	T09-13058	DRI	P	15	0.000	0.017	0.027	0.000	0.033	0.098	-----
blank filter	T09-13058	DRI	S	16	0.000	0.017	0.075	0.000	0.020	0.071	-----
blank filter	T09-13058	DRI	Cl	17	0.000	0.017	0.019	0.000	0.015	0.048	-----
blank filter	T09-13058	DRI	K	19	0.019	0.023	0.017	0.000	0.012	0.038	-----
blank filter	T09-13058	DRI	Ca	20	0.000	0.068	0.021	0.000	0.014	0.046	-----
blank filter	T09-13058	DRI	Ti	22	0.003	0.025	0.013	0.000	0.012	0.042	-----
blank filter	T09-13058	DRI	V	23	0.000	0.017	0.001	0.000	0.009	0.029	-----
blank filter	T09-13058	DRI	Cr	24	0.005	0.017	0.012	0.011	0.008	0.021	-----
blank filter	T09-13058	DRI	Mn	25	0.000	0.051	0.024	0.000	0.005	0.017	-----
blank filter	T09-13058	DRI	Fe	26	0.000	0.017	0.031	0.000	0.004	0.014	-----
blank filter	T09-13058	DRI	Co	27	0.018	0.017	0.001	0.000	0.004	0.011	-----
blank filter	T09-13058	DRI	Ni	28	0.000	0.048	0.006	0.001	0.004	0.011	-----
blank filter	T09-13058	DRI	Cu	29	0.000	0.060	0.010	0.000	0.004	0.013	-----
blank filter	T09-13058	DRI	Zn	30	0.000	0.017	0.010	0.000	0.005	0.034	-----
blank filter	T09-13058	DRI	As	33	0.000	0.017	0.001	0.000	0.006	0.016	-----
blank filter	T09-13058	DRI	Se	34	0.000	0.017	0.024	0.000	0.006	0.019	-----
blank filter	T09-13058	DRI	Br	35	0.019	0.017	0.017	0.007	0.009	0.017	-----

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	T09-13058	DRI	Rb	37	0.000	0.017	0.013	0.000	0.005	0.017	-----
blank filter	T09-13058	DRI	Sr	38	0.000	0.017	0.023	0.000	0.006	0.022	-----
blank filter	T09-13058	DRI	Zr	40	0.018	0.028	0.041	0.000	0.081	0.044	-----
blank filter	T09-13058	DRI	Ag	47	0.011	0.038	0.049	0.034	0.136	0.142	-----
blank filter	T09-13058	DRI	Cd	48	0.000	0.048	0.060	0.000	0.047	0.180	-----
blank filter	T09-13058	DRI	In	49	0.000	0.051	0.036	0.034	0.215	0.213	-----
blank filter	T09-13058	DRI	Sn	50	0.000	0.051	0.045	0.000	0.088	0.307	-----
blank filter	T09-13058	DRI	Sb	51	0.003	0.081	0.084	0.012	0.407	0.403	-----
blank filter	T09-13058	DRI	Cs	55	0.000	0.166	0.014	0.000	0.030	0.331	-----
blank filter	T09-13058	DRI	Ba	56	0.106	0.193	0.007	0.000	0.028	0.099	-----
blank filter	T09-13058	DRI	Ce	58	0.000	0.225	0.015	0.000	0.023	0.066	-----
blank filter	T09-13058	DRI	Pb	82	0.010	0.018	0.030	0.009	0.016	0.047	-----
blank filter	T09-13059	DRI	Na	11	0.663	1.649	0.911	0.000	0.094	0.386	-----
blank filter	T09-13059	DRI	Mg	12	0.000	0.511	0.346	0.000	0.033	0.110	-----
blank filter	T09-13059	DRI	Al	13	0.000	0.101	0.079	0.000	0.082	0.122	-----
blank filter	T09-13059	DRI	Si	14	0.000	0.062	0.092	0.000	0.041	0.108	-----
blank filter	T09-13059	DRI	P	15	0.003	0.017	0.027	0.000	0.033	0.098	-----
blank filter	T09-13059	DRI	S	16	0.000	0.017	0.075	0.000	0.020	0.071	-----
blank filter	T09-13059	DRI	Cl	17	0.001	0.017	0.019	0.000	0.015	0.048	-----
blank filter	T09-13059	DRI	K	19	0.000	0.023	0.017	0.000	0.012	0.038	-----
blank filter	T09-13059	DRI	Ca	20	0.000	0.068	0.021	0.000	0.014	0.046	-----
blank filter	T09-13059	DRI	Ti	22	0.024	0.025	0.013	0.000	0.012	0.042	-----
blank filter	T09-13059	DRI	V	23	0.008	0.017	0.001	0.000	0.009	0.029	-----
blank filter	T09-13059	DRI	Cr	24	0.000	0.017	0.012	0.000	0.007	0.021	-----
blank filter	T09-13059	DRI	Mn	25	0.004	0.051	0.024	0.000	0.005	0.017	-----
blank filter	T09-13059	DRI	Fe	26	0.000	0.017	0.031	0.000	0.004	0.014	-----
blank filter	T09-13059	DRI	Co	27	0.004	0.017	0.001	0.000	0.004	0.011	-----
blank filter	T09-13059	DRI	Ni	28	0.000	0.048	0.006	0.005	0.004	0.011	-----
blank filter	T09-13059	DRI	Cu	29	0.011	0.060	0.010	0.000	0.003	0.013	-----
blank filter	T09-13059	DRI	Zn	30	0.010	0.017	0.010	0.000	0.004	0.034	-----
blank filter	T09-13059	DRI	As	33	0.000	0.017	0.001	0.000	0.006	0.016	-----
blank filter	T09-13059	DRI	Se	34	0.000	0.017	0.024	0.000	0.006	0.019	-----
blank filter	T09-13059	DRI	Br	35	0.009	0.017	0.017	0.004	0.010	0.017	-----
blank filter	T09-13059	DRI	Rb	37	0.000	0.017	0.013	0.000	0.005	0.017	-----
blank filter	T09-13059	DRI	Sr	38	0.007	0.017	0.023	0.000	0.005	0.022	-----
blank filter	T09-13059	DRI	Zr	40	0.023	0.028	0.041	0.000	0.081	0.044	-----
blank filter	T09-13059	DRI	Ag	47	0.000	0.038	0.049	0.000	0.045	0.142	-----
blank filter	T09-13059	DRI	Cd	48	0.000	0.048	0.060	0.000	0.047	0.180	-----
blank filter	T09-13059	DRI	In	49	0.000	0.051	0.036	0.000	0.050	0.213	-----
blank filter	T09-13059	DRI	Sn	50	0.034	0.051	0.045	0.000	0.088	0.307	-----
blank filter	T09-13059	DRI	Sb	51	0.030	0.081	0.084	0.000	0.086	0.403	-----
blank filter	T09-13059	DRI	Cs	55	0.000	0.166	0.014	0.002	0.033	0.331	-----
blank filter	T09-13059	DRI	Ba	56	0.000	0.192	0.007	0.000	0.028	0.099	-----
blank filter	T09-13059	DRI	Ce	58	0.532	0.231	0.015	0.000	0.023	0.066	-----

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	T09-13059	DRI	Pb	82	0.000	0.018	0.030	0.001	0.021	0.047	-----
blank filter	T09-13060	ODEQ	Na	11	-----	-----	-----	0.000	0.094	0.386	-----
blank filter	T09-13060	ODEQ	Mg	12	-----	-----	-----	0.005	0.034	0.110	-----
blank filter	T09-13060	ODEQ	Al	13	<0.18	0.059	0.180	0.000	0.082	0.122	-----
blank filter	T09-13060	ODEQ	Si	14	<0.098	0.033	0.098	0.000	0.041	0.108	-----
blank filter	T09-13060	ODEQ	P	15	<0.055	0.018	0.055	0.000	0.033	0.098	-----
blank filter	T09-13060	ODEQ	S	16	<0.14	0.048	0.140	0.000	0.020	0.071	-----
blank filter	T09-13060	ODEQ	Cl	17	<0.12	0.041	0.120	0.000	0.015	0.048	-----
blank filter	T09-13060	ODEQ	K	19	<0.051	0.017	0.051	0.000	0.012	0.038	-----
blank filter	T09-13060	ODEQ	Ca	20	<0.14	0.046	0.140	0.000	0.014	0.046	-----
blank filter	T09-13060	ODEQ	Ti	22	<0.13	0.044	0.130	0.000	0.012	0.042	-----
blank filter	T09-13060	ODEQ	V	23	<0.046	0.015	0.046	0.000	0.009	0.029	-----
blank filter	T09-13060	ODEQ	Cr	24	<0.031	0.010	0.031	0.000	0.009	0.021	-----
blank filter	T09-13060	ODEQ	Mn	25	<0.038	0.013	0.038	0.000	0.005	0.017	-----
blank filter	T09-13060	ODEQ	Fe	26	<0.032	0.011	0.032	0.000	0.004	0.014	-----
blank filter	T09-13060	ODEQ	Co	27	<0.033	0.011	0.033	0.000	0.004	0.011	-----
blank filter	T09-13060	ODEQ	Ni	28	<0.022	0.007	0.022	0.000	0.004	0.011	-----
blank filter	T09-13060	ODEQ	Cu	29	<0.10 est	0.035	0.100	0.000	0.004	0.013	-----
blank filter	T09-13060	ODEQ	Zn	30	<0.020	0.007	0.020	0.000	0.005	0.034	-----
blank filter	T09-13060	ODEQ	As	33	<0.027	0.009	0.027	0.000	0.006	0.016	-----
blank filter	T09-13060	ODEQ	Se	34	<0.030	0.010	0.030	0.001	0.010	0.019	-----
blank filter	T09-13060	ODEQ	Br	35	<0.027	0.009	0.027	0.000	0.006	0.017	-----
blank filter	T09-13060	ODEQ	Rb	37	<0.026	0.009	0.026	0.000	0.005	0.017	-----
blank filter	T09-13060	ODEQ	Sr	38	<0.021	0.007	0.021	0.008	0.012	0.022	-----
blank filter	T09-13060	ODEQ	Zr	40	<0.031	0.010	0.031	0.000	0.081	0.044	-----
blank filter	T09-13060	ODEQ	Ag	47	<0.090	0.030	0.090	0.000	0.045	0.142	-----
blank filter	T09-13060	ODEQ	Cd	48	<0.093	0.031	0.093	0.000	0.047	0.180	-----
blank filter	T09-13060	ODEQ	In	49	<0.10	0.034	0.100	0.014	0.226	0.213	-----
blank filter	T09-13060	ODEQ	Sn	50	<0.16	0.052	0.160	0.000	0.088	0.307	-----
blank filter	T09-13060	ODEQ	Sb	51	<0.15	0.049	0.150	0.000	0.104	0.403	-----
blank filter	T09-13060	ODEQ	Cs	55	<0.24	0.080	0.240	0.000	0.030	0.331	-----
blank filter	T09-13060	ODEQ	Ba	56	<0.34	0.113	0.340	0.000	0.028	0.099	-----
blank filter	T09-13060	ODEQ	Ce	58	<0.60	0.201	0.600	0.000	0.023	0.066	-----
blank filter	T09-13060	ODEQ	Pb	82	<0.067	0.022	0.067	0.010	0.016	0.047	-----
blank filter	T09-13061	ODEQ	Na	11	-----	-----	-----	0.038	0.088	0.386	-----
blank filter	T09-13061	ODEQ	Mg	12	-----	-----	-----	0.000	0.035	0.110	-----
blank filter	T09-13061	ODEQ	Al	13	<0.18	0.059	0.180	0.000	0.082	0.122	-----
blank filter	T09-13061	ODEQ	Si	14	<0.098	0.033	0.098	0.000	0.041	0.108	-----
blank filter	T09-13061	ODEQ	P	15	<0.055	0.018	0.055	0.000	0.033	0.098	-----
blank filter	T09-13061	ODEQ	S	16	<0.14	0.048	0.140	0.013	0.020	0.071	-----
blank filter	T09-13061	ODEQ	Cl	17	<0.12	0.041	0.120	0.000	0.015	0.048	-----
blank filter	T09-13061	ODEQ	K	19	<0.054	0.018	0.054	0.000	0.012	0.038	-----
blank filter	T09-13061	ODEQ	Ca	20	<0.14	0.047	0.140	0.000	0.014	0.046	-----
blank filter	T09-13061	ODEQ	Ti	22	<0.13	0.044	0.130	0.000	0.012	0.042	-----

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	T09-13061	ODEQ	V	23	<0.046	0.015	0.046	0.000	0.009	0.029	-----
blank filter	T09-13061	ODEQ	Cr	24	<0.031	0.010	0.031	0.000	0.007	0.021	-----
blank filter	T09-13061	ODEQ	Mn	25	<0.038	0.013	0.038	0.000	0.005	0.017	-----
blank filter	T09-13061	ODEQ	Fe	26	<0.033	0.011	0.033	0.000	0.004	0.014	-----
blank filter	T09-13061	ODEQ	Co	27	<0.034	0.011	0.034	0.000	0.004	0.011	-----
blank filter	T09-13061	ODEQ	Ni	28	<0.022	0.007	0.022	0.003	0.004	0.011	-----
blank filter	T09-13061	ODEQ	Cu	29	<0.10 est	0.035	0.100	0.000	0.004	0.013	-----
blank filter	T09-13061	ODEQ	Zn	30	<0.021	0.007	0.021	0.000	0.004	0.034	-----
blank filter	T09-13061	ODEQ	As	33	<0.028	0.009	0.028	0.000	0.006	0.016	-----
blank filter	T09-13061	ODEQ	Se	34	<0.030	0.010	0.030	0.000	0.006	0.019	-----
blank filter	T09-13061	ODEQ	Br	35	<0.027	0.009	0.027	0.000	0.006	0.017	-----
blank filter	T09-13061	ODEQ	Rb	37	<0.026	0.009	0.026	0.000	0.005	0.017	-----
blank filter	T09-13061	ODEQ	Sr	38	<0.021	0.007	0.021	0.000	0.006	0.022	-----
blank filter	T09-13061	ODEQ	Zr	40	<0.031	0.010	0.031	0.000	0.081	0.044	-----
blank filter	T09-13061	ODEQ	Ag	47	<0.090	0.030	0.090	0.000	0.045	0.142	-----
blank filter	T09-13061	ODEQ	Cd	48	<0.095	0.032	0.095	0.000	0.047	0.180	-----
blank filter	T09-13061	ODEQ	In	49	<0.10	0.034	0.100	0.000	0.050	0.213	-----
blank filter	T09-13061	ODEQ	Sn	50	<0.16	0.052	0.160	0.028	0.305	0.307	-----
blank filter	T09-13061	ODEQ	Sb	51	<0.15	0.048	0.150	0.000	0.104	0.403	-----
blank filter	T09-13061	ODEQ	Cs	55	<0.24	0.079	0.240	0.021	0.049	0.331	-----
blank filter	T09-13061	ODEQ	Ba	56	<0.34	0.113	0.340	0.000	0.028	0.099	-----
blank filter	T09-13061	ODEQ	Ce	58	<0.61	0.202	0.610	0.000	0.023	0.066	-----
blank filter	T09-13061	ODEQ	Pb	82	<0.067	0.022	0.067	0.007	0.021	0.047	-----
blank filter	T09-13062	AQMD	Na	11	-----	-----	-----	0.000	0.094	0.386	-----
blank filter	T09-13062	AQMD	Mg	12	ND	-----	1.680	0.000	0.035	0.110	-----
blank filter	T09-13062	AQMD	Al	13	ND	-----	1.200	0.000	0.082	0.122	-----
blank filter	T09-13062	AQMD	Si	14	ND	-----	2.600	0.000	0.041	0.108	-----
blank filter	T09-13062	AQMD	P	15	ND	-----	1.585	0.000	0.033	0.098	-----
blank filter	T09-13062	AQMD	S	16	ND	-----	0.251	0.000	0.020	0.071	-----
blank filter	T09-13062	AQMD	Cl	17	ND	-----	0.174	0.000	0.018	0.048	-----
blank filter	T09-13062	AQMD	K	19	ND	-----	0.061	0.000	0.013	0.038	-----
blank filter	T09-13062	AQMD	Ca	20	ND	-----	0.067	0.000	0.015	0.046	-----
blank filter	T09-13062	AQMD	Ti	22	ND	-----	0.061	0.000	0.012	0.042	-----
blank filter	T09-13062	AQMD	V	23	ND	-----	0.070	0.000	0.009	0.029	-----
blank filter	T09-13062	AQMD	Cr	24	ND	-----	0.060	0.000	0.007	0.021	-----
blank filter	T09-13062	AQMD	Mn	25	ND	-----	0.070	0.000	0.005	0.017	-----
blank filter	T09-13062	AQMD	Fe	26	ND	-----	0.035	0.000	0.004	0.014	-----
blank filter	T09-13062	AQMD	Co	27	ND	-----	0.020	0.004	0.004	0.011	-----
blank filter	T09-13062	AQMD	Ni	28	ND	-----	0.013	0.000	0.004	0.011	-----
blank filter	T09-13062	AQMD	Cu	29	ND	-----	0.018	0.000	0.004	0.013	-----
blank filter	T09-13062	AQMD	Zn	30	ND	-----	0.021	0.000	0.005	0.034	-----
blank filter	T09-13062	AQMD	As	33	ND	-----	0.130	0.000	0.006	0.016	-----
blank filter	T09-13062	AQMD	Se	34	ND	-----	0.070	0.000	0.006	0.019	-----
blank filter	T09-13062	AQMD	Br	35	0.031	0.012	0.019	0.001	0.010	0.017	-----

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	T09-13062	AQMD	Rb	37	ND	-----	0.070	0.000	0.005	0.017	-----
blank filter	T09-13062	AQMD	Sr	38	0.044	0.019	0.030	0.000	0.006	0.022	-----
blank filter	T09-13062	AQMD	Zr	40	#N/A	-----	-----	0.012	0.113	0.044	-----
blank filter	T09-13062	AQMD	Ag	47	ND	-----	0.180	0.000	0.045	0.142	-----
blank filter	T09-13062	AQMD	Cd	48	ND	-----	0.210	0.000	0.047	0.180	-----
blank filter	T09-13062	AQMD	In	49	0.055	0.020	0.030	0.000	0.050	0.213	-----
blank filter	T09-13062	AQMD	Sn	50	0.055	0.010	0.010	0.000	0.088	0.307	-----
blank filter	T09-13062	AQMD	Sb	51	ND	-----	0.530	0.000	0.104	0.403	-----
blank filter	T09-13062	AQMD	Cs	55	0.073	0.041	0.070	0.000	0.030	0.331	-----
blank filter	T09-13062	AQMD	Ba	56	ND	-----	0.290	0.000	0.028	0.099	-----
blank filter	T09-13062	AQMD	Ce	58	-----	-----	-----	0.000	0.023	0.066	-----
blank filter	T09-13062	AQMD	Pb	82	ND	-----	0.180	0.000	0.016	0.047	-----
blank filter	T09-13063	AQMD	Na	11	-----	-----	-----	0.002	0.089	0.386	-----
blank filter	T09-13063	AQMD	Mg	12	ND	-----	1.680	0.000	0.033	0.110	-----
blank filter	T09-13063	AQMD	Al	13	ND	-----	1.200	0.000	0.082	0.122	-----
blank filter	T09-13063	AQMD	Si	14	ND	-----	2.600	0.000	0.041	0.108	-----
blank filter	T09-13063	AQMD	P	15	ND	-----	1.585	0.000	0.033	0.098	-----
blank filter	T09-13063	AQMD	S	16	ND	-----	0.251	0.000	0.020	0.071	-----
blank filter	T09-13063	AQMD	Cl	17	ND	-----	0.174	0.000	0.015	0.048	-----
blank filter	T09-13063	AQMD	K	19	ND	-----	0.061	0.000	0.012	0.038	-----
blank filter	T09-13063	AQMD	Ca	20	ND	-----	0.067	0.000	0.015	0.046	-----
blank filter	T09-13063	AQMD	Ti	22	ND	-----	0.061	0.000	0.012	0.042	-----
blank filter	T09-13063	AQMD	V	23	ND	-----	0.070	0.000	0.009	0.029	-----
blank filter	T09-13063	AQMD	Cr	24	ND	-----	0.060	0.000	0.007	0.021	-----
blank filter	T09-13063	AQMD	Mn	25	0.197	0.052	0.070	0.000	0.005	0.017	-----
blank filter	T09-13063	AQMD	Fe	26	0.096	0.026	0.035	0.084	0.009	0.014	-----
blank filter	T09-13063	AQMD	Co	27	ND	-----	0.020	0.003	0.005	0.011	-----
blank filter	T09-13063	AQMD	Ni	28	ND	-----	0.013	0.008	0.004	0.011	-----
blank filter	T09-13063	AQMD	Cu	29	ND	-----	0.018	0.000	0.004	0.013	-----
blank filter	T09-13063	AQMD	Zn	30	0.024	0.013	0.021	0.000	0.005	0.034	-----
blank filter	T09-13063	AQMD	As	33	ND	-----	0.130	0.000	0.006	0.016	-----
blank filter	T09-13063	AQMD	Se	34	ND	-----	0.070	0.000	0.006	0.019	-----
blank filter	T09-13063	AQMD	Br	35	ND	-----	0.019	0.006	0.010	0.017	-----
blank filter	T09-13063	AQMD	Rb	37	ND	-----	0.070	0.000	0.005	0.017	-----
blank filter	T09-13063	AQMD	Sr	38	ND	-----	0.030	0.000	0.005	0.022	-----
blank filter	T09-13063	AQMD	Zr	40	-----	-----	-----	0.000	0.081	0.044	-----
blank filter	T09-13063	AQMD	Ag	47	ND	-----	0.180	0.000	0.045	0.142	-----
blank filter	T09-13063	AQMD	Cd	48	ND	-----	0.210	0.000	0.047	0.180	-----
blank filter	T09-13063	AQMD	In	49	ND	-----	0.030	0.016	0.226	0.213	-----
blank filter	T09-13063	AQMD	Sn	50	0.013	0.006	0.010	0.000	0.088	0.307	-----
blank filter	T09-13063	AQMD	Sb	51	ND	-----	0.530	0.000	0.104	0.403	-----
blank filter	T09-13063	AQMD	Cs	55	ND	-----	0.070	0.000	0.030	0.331	-----
blank filter	T09-13063	AQMD	Ba	56	ND	-----	0.290	0.000	0.028	0.099	-----
blank filter	T09-13063	AQMD	Ce	58	-----	-----	-----	0.000	0.023	0.066	-----

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	T09-13063	AQMD	Pb	82	ND	-----	0.180	0.000	0.016	0.047	-----
blank filter	T09-13064	UCD	Na	11	0.000	0.000	0.336	0.000	0.094	0.386	-----
blank filter	T09-13064	UCD	Mg	12	0.000	0.000	0.110	0.000	0.033	0.110	-----
blank filter	T09-13064	UCD	Al	13	0.000	0.000	0.054	0.000	0.082	0.122	-----
blank filter	T09-13064	UCD	Si	14	0.293	0.157	0.028	0.000	0.041	0.108	-----
blank filter	T09-13064	UCD	P	15	0.236	0.096	0.017	0.000	0.033	0.098	-----
blank filter	T09-13064	UCD	S	16	0.000	0.000	0.012	0.000	0.020	0.071	-----
blank filter	T09-13064	UCD	Cl	17	0.000	0.000	0.008	0.000	0.015	0.048	-----
blank filter	T09-13064	UCD	K	19	0.000	0.000	0.005	0.000	0.012	0.038	-----
blank filter	T09-13064	UCD	Ca	20	0.047	0.011	0.002	0.000	0.014	0.046	-----
blank filter	T09-13064	UCD	Ti	22	0.000	0.000	0.001	0.000	0.012	0.042	-----
blank filter	T09-13064	UCD	V	23	0.000	0.000	0.001	0.000	0.009	0.029	-----
blank filter	T09-13064	UCD	Cr	24	0.000	0.000	0.001	0.000	0.007	0.021	-----
blank filter	T09-13064	UCD	Mn	25	0.000	0.000	0.001	0.000	0.005	0.017	-----
blank filter	T09-13064	UCD	Fe	26	0.007	0.002	0.002	0.000	0.004	0.014	-----
blank filter	T09-13064	UCD	Co	27	-----	-----	-----	0.002	0.004	0.011	-----
blank filter	T09-13064	UCD	Ni	28	0.000	0.000	0.001	0.002	0.004	0.011	-----
blank filter	T09-13064	UCD	Cu	29	0.000	0.000	0.001	0.000	0.004	0.013	-----
blank filter	T09-13064	UCD	Zn	30	0.000	0.000	0.001	0.000	0.005	0.034	-----
blank filter	T09-13064	UCD	As	33	0.000	0.000	0.001	0.000	0.006	0.016	-----
blank filter	T09-13064	UCD	Se	34	0.000	0.000	0.001	0.000	0.006	0.019	-----
blank filter	T09-13064	UCD	Br	35	0.000	0.000	0.001	0.000	0.006	0.017	-----
blank filter	T09-13064	UCD	Rb	37	0.000	0.000	0.002	0.000	0.005	0.017	-----
blank filter	T09-13064	UCD	Sr	38	0.000	0.000	0.003	0.000	0.005	0.022	-----
blank filter	T09-13064	UCD	Zr	40	0.000	0.000	0.005	0.000	0.081	0.044	-----
blank filter	T09-13064	UCD	Ag	47	-----	-----	-----	0.000	0.045	0.142	-----
blank filter	T09-13064	UCD	Cd	48	-----	-----	-----	0.000	0.047	0.180	-----
blank filter	T09-13064	UCD	In	49	-----	-----	-----	0.000	0.050	0.213	-----
blank filter	T09-13064	UCD	Sn	50	-----	-----	-----	0.000	0.088	0.307	-----
blank filter	T09-13064	UCD	Sb	51	-----	-----	-----	0.000	0.104	0.403	-----
blank filter	T09-13064	UCD	Cs	55	-----	-----	-----	0.000	0.030	0.331	-----
blank filter	T09-13064	UCD	Ba	56	-----	-----	-----	0.000	0.028	0.099	-----
blank filter	T09-13064	UCD	Ce	58	-----	-----	-----	0.000	0.023	0.066	-----
blank filter	T09-13064	UCD	Pb	82	0.021	0.006	0.001	0.000	0.016	0.047	-----
blank filter	T09-13065	UCD	Na	11	1.235	0.474	0.349	0.000	0.100	0.386	-----
blank filter	T09-13065	UCD	Mg	12	0.000	0.000	0.116	0.000	0.035	0.110	-----
blank filter	T09-13065	UCD	Al	13	0.000	0.000	0.057	0.000	0.099	0.122	-----
blank filter	T09-13065	UCD	Si	14	0.462	0.122	0.030	0.000	0.041	0.108	-----
blank filter	T09-13065	UCD	P	15	0.315	0.070	0.019	0.000	0.033	0.098	-----
blank filter	T09-13065	UCD	S	16	0.000	0.000	0.013	0.000	0.024	0.071	-----
blank filter	T09-13065	UCD	Cl	17	0.000	0.000	0.009	0.000	0.018	0.048	-----
blank filter	T09-13065	UCD	K	19	0.038	0.012	0.006	0.000	0.013	0.038	-----
blank filter	T09-13065	UCD	Ca	20	0.000	0.000	0.003	0.000	0.016	0.046	-----
blank filter	T09-13065	UCD	Ti	22	0.016	0.003	0.001	0.000	0.012	0.042	-----

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	T09-13065	UCD	V	23	0.000	0.000	0.001	0.000	0.009	0.029	-----
blank filter	T09-13065	UCD	Cr	24	0.000	0.000	0.001	0.000	0.007	0.021	-----
blank filter	T09-13065	UCD	Mn	25	0.000	0.000	0.001	0.000	0.005	0.017	-----
blank filter	T09-13065	UCD	Fe	26	0.004	0.002	0.002	0.000	0.004	0.014	-----
blank filter	T09-13065	UCD	Co	27	-----	-----	-----	0.003	0.005	0.011	-----
blank filter	T09-13065	UCD	Ni	28	0.000	0.000	0.001	0.000	0.004	0.011	-----
blank filter	T09-13065	UCD	Cu	29	0.000	0.000	0.001	0.000	0.004	0.013	-----
blank filter	T09-13065	UCD	Zn	30	0.000	0.000	0.001	0.000	0.005	0.034	-----
blank filter	T09-13065	UCD	As	33	0.000	0.000	0.001	0.000	0.006	0.016	-----
blank filter	T09-13065	UCD	Se	34	0.005	0.001	0.001	0.000	0.006	0.019	-----
blank filter	T09-13065	UCD	Br	35	0.006	0.002	0.001	0.003	0.010	0.017	-----
blank filter	T09-13065	UCD	Rb	37	0.000	0.000	0.003	0.000	0.005	0.017	-----
blank filter	T09-13065	UCD	Sr	38	0.012	0.003	0.003	0.000	0.006	0.022	-----
blank filter	T09-13065	UCD	Zr	40	0.198	0.022	0.006	0.000	0.081	0.044	-----
blank filter	T09-13065	UCD	Ag	47	-----	-----	-----	0.000	0.045	0.142	-----
blank filter	T09-13065	UCD	Cd	48	-----	-----	-----	0.000	0.047	0.180	-----
blank filter	T09-13065	UCD	In	49	-----	-----	-----	0.017	0.249	0.213	-----
blank filter	T09-13065	UCD	Sn	50	-----	-----	-----	0.000	0.088	0.307	-----
blank filter	T09-13065	UCD	Sb	51	-----	-----	-----	0.000	0.104	0.403	-----
blank filter	T09-13065	UCD	Cs	55	-----	-----	-----	0.000	0.030	0.331	-----
blank filter	T09-13065	UCD	Ba	56	-----	-----	-----	0.000	0.028	0.099	-----
blank filter	T09-13065	UCD	Ce	58	-----	-----	-----	0.000	0.023	0.066	-----
blank filter	T09-13065	UCD	Pb	82	0.015	0.006	0.002	0.000	0.016	0.047	-----

**** 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	
168-hr event	T09-13022	DRI	Na	11	14.792	0.909	0.270	8.536	1.438	0.866	-----
168-hr event	T09-13022	DRI	Mg	12	0.366	0.152	0.103	0.000	0.000	0.282	-----
168-hr event	T09-13022	DRI	Al	13	1.486	0.035	0.023	2.114	0.156	0.138	1.582
168-hr event	T09-13022	DRI	Si	14	4.941	0.038	0.027	8.642	0.448	0.075	5.468
168-hr event	T09-13022	DRI	P	15	0.000	0.005	0.008	0.000	0.000	0.046	-----
168-hr event	T09-13022	DRI	S	16	48.310	0.173	0.022	44.829	2.248	0.028	45.031
168-hr event	T09-13022	DRI	Cl	17	0.440	0.006	0.006	0.000	0.000	0.017	-----
168-hr event	T09-13022	DRI	K	19	4.119	0.012	0.005	4.175	0.211	0.008	4.216
168-hr event	T09-13022	DRI	Ca	20	1.661	0.024	0.006	1.786	0.092	0.004	1.628
168-hr event	T09-13022	DRI	Ti	22	0.181	0.008	0.004	0.141	0.008	0.002	-----
168-hr event	T09-13022	DRI	V	23	0.020	0.005	0.000	0.022	0.003	0.002	-----
168-hr event	T09-13022	DRI	Cr	24	0.020	0.005	0.003	0.010	0.001	0.001	-----
168-hr event	T09-13022	DRI	Mn	25	0.085	0.016	0.007	0.085	0.005	0.001	-----
168-hr event	T09-13022	DRI	Fe	26	2.158	0.009	0.009	1.969	0.100	0.002	1.970
168-hr event	T09-13022	DRI	Ni	28	0.008	0.014	0.002	0.009	0.001	0.002	-----
168-hr event	T09-13022	DRI	Cu	29	0.052	0.018	0.003	0.044	0.003	0.002	-----
168-hr event	T09-13022	DRI	Zn	30	0.481	0.006	0.003	0.375	0.019	0.001	0.415
168-hr event	T09-13022	DRI	As	33	0.015	0.005	0.000	0.028	0.003	0.005	-----
168-hr event	T09-13022	DRI	Se	34	0.000	0.005	0.007	0.030	0.002	0.001	-----
168-hr event	T09-13022	DRI	Br	35	0.285	0.006	0.005	0.303	0.016	0.001	0.312
168-hr event	T09-13022	DRI	Rb	37	0.000	0.005	0.004	0.010	0.004	0.002	-----
168-hr event	T09-13022	DRI	Sr	38	0.025	0.005	0.007	0.017	0.002	0.003	-----
168-hr event	T09-13022	DRI	Zr	40	0.019	0.008	0.012	0.000	0.000	0.005	-----
168-hr event	T09-13022	DRI	Pb	82	0.118	0.006	0.009	0.081	0.006	0.002	-----
168-hr event	T09-13023	DRI	Na	11	16.232	0.958	0.270	13.035	1.127	0.947	-----
168-hr event	T09-13023	DRI	Mg	12	0.458	0.152	0.103	0.501	0.114	0.304	-----
168-hr event	T09-13023	DRI	Al	13	1.432	0.035	0.023	2.370	0.164	0.148	1.582
168-hr event	T09-13023	DRI	Si	14	5.405	0.040	0.027	9.713	0.504	0.081	5.468
168-hr event	T09-13023	DRI	P	15	0.000	0.005	0.008	0.000	0.000	0.049	-----
168-hr event	T09-13023	DRI	S	16	51.369	0.183	0.022	49.550	2.484	0.030	45.031
168-hr event	T09-13023	DRI	Cl	17	0.449	0.006	0.006	0.000	0.000	0.018	-----
168-hr event	T09-13023	DRI	K	19	4.372	0.012	0.005	4.580	0.231	0.008	4.216
168-hr event	T09-13023	DRI	Ca	20	1.850	0.024	0.006	2.021	0.103	0.005	1.628
168-hr event	T09-13023	DRI	Ti	22	0.223	0.008	0.004	0.158	0.009	0.002	-----
168-hr event	T09-13023	DRI	V	23	0.018	0.005	0.000	0.021	0.003	0.002	-----
168-hr event	T09-13023	DRI	Cr	24	0.012	0.005	0.003	0.008	0.001	0.001	-----
168-hr event	T09-13023	DRI	Mn	25	0.101	0.016	0.007	0.100	0.006	0.001	-----
168-hr event	T09-13023	DRI	Fe	26	2.269	0.010	0.009	2.227	0.113	0.002	1.970
168-hr event	T09-13023	DRI	Ni	28	0.007	0.014	0.002	0.007	0.001	0.002	-----
168-hr event	T09-13023	DRI	Cu	29	0.053	0.018	0.003	0.055	0.003	0.002	-----
168-hr event	T09-13023	DRI	Zn	30	0.465	0.006	0.003	0.438	0.023	0.001	0.415
168-hr event	T09-13023	DRI	As	33	0.026	0.005	0.000	0.030	0.003	0.006	-----
168-hr event	T09-13023	DRI	Se	34	0.000	0.005	0.007	0.035	0.002	0.001	-----
168-hr event	T09-13023	DRI	Br	35	0.307	0.006	0.005	0.345	0.018	0.001	0.312

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	
168-hr event	T09-13023	DRI	Rb	37	0.000	0.005	0.004	0.012	0.004	0.002	-----
168-hr event	T09-13023	DRI	Sr	38	0.024	0.005	0.007	0.020	0.002	0.003	-----
168-hr event	T09-13023	DRI	Zr	40	0.023	0.008	0.012	0.000	0.000	0.005	-----
168-hr event	T09-13023	DRI	Pb	82	0.104	0.006	0.009	0.094	0.007	0.002	-----
168-hr event	T09-13024	RTI	Na	11	5.104	0.428	0.065	15.283	1.316	0.970	-----
168-hr event	T09-13024	RTI	Mg	12	0.572	0.048	0.024	0.000	0.000	0.311	-----
168-hr event	T09-13024	RTI	Al	13	1.637	0.130	0.051	2.420	0.178	0.151	1.582
168-hr event	T09-13024	RTI	Si	14	6.256	0.415	0.027	9.723	0.503	0.082	5.468
168-hr event	T09-13024	RTI	P	15	0.158	0.027	0.010	0.000	0.000	0.050	-----
168-hr event	T09-13024	RTI	S	16	46.534	2.331	0.013	48.867	2.450	0.030	45.031
168-hr event	T09-13024	RTI	Cl	17	0.654	0.036	0.009	0.000	0.000	0.018	-----
168-hr event	T09-13024	RTI	K	19	4.807	0.241	0.009	4.554	0.230	0.008	4.216
168-hr event	T09-13024	RTI	Ca	20	1.602	0.081	0.010	2.055	0.105	0.005	1.628
168-hr event	T09-13024	RTI	Ti	22	0.165	0.014	0.013	0.165	0.009	0.003	-----
168-hr event	T09-13024	RTI	V	23	0.011	0.006	0.009	0.018	0.003	0.002	-----
168-hr event	T09-13024	RTI	Cr	24	0.014	0.004	0.007	0.006	0.001	0.001	-----
168-hr event	T09-13024	RTI	Mn	25	0.094	0.006	0.006	0.092	0.005	0.001	-----
168-hr event	T09-13024	RTI	Fe	26	2.187	0.110	0.007	2.218	0.112	0.002	1.970
168-hr event	T09-13024	RTI	Ni	28	0.015	0.002	0.004	0.009	0.001	0.002	-----
168-hr event	T09-13024	RTI	Cu	29	0.064	0.004	0.006	0.053	0.003	0.002	-----
168-hr event	T09-13024	RTI	Zn	30	0.493	0.025	0.006	0.441	0.023	0.001	0.415
168-hr event	T09-13024	RTI	As	33	0.018	0.006	0.008	0.028	0.003	0.006	-----
168-hr event	T09-13024	RTI	Se	34	0.040	0.006	0.009	0.035	0.002	0.001	-----
168-hr event	T09-13024	RTI	Br	35	0.303	0.018	0.008	0.334	0.017	0.001	0.312
168-hr event	T09-13024	RTI	Rb	37	0.008	0.006	0.009	0.017	0.004	0.002	-----
168-hr event	T09-13024	RTI	Sr	38	0.029	0.006	0.011	0.027	0.002	0.003	-----
168-hr event	T09-13024	RTI	Zr	40	0.000	0.020	0.080	0.010	0.002	0.005	-----
168-hr event	T09-13024	RTI	Pb	82	0.115	0.015	0.017	0.098	0.007	0.002	-----
168-hr event	T09-13025	RTI	Na	11	5.211	0.437	0.065	6.968	0.737	0.929	-----
168-hr event	T09-13025	RTI	Mg	12	0.594	0.050	0.024	0.475	0.116	0.301	-----
168-hr event	T09-13025	RTI	Al	13	1.740	0.136	0.051	2.425	0.173	0.147	1.582
168-hr event	T09-13025	RTI	Si	14	6.418	0.427	0.027	9.566	0.498	0.080	5.468
168-hr event	T09-13025	RTI	P	15	0.154	0.027	0.010	0.000	0.000	0.049	-----
168-hr event	T09-13025	RTI	S	16	47.264	2.367	0.013	48.416	2.428	0.029	45.031
168-hr event	T09-13025	RTI	Cl	17	0.632	0.035	0.009	0.000	0.000	0.018	-----
168-hr event	T09-13025	RTI	K	19	4.875	0.244	0.009	4.488	0.227	0.008	4.216
168-hr event	T09-13025	RTI	Ca	20	1.672	0.084	0.010	2.030	0.104	0.005	1.628
168-hr event	T09-13025	RTI	Ti	22	0.155	0.014	0.013	0.156	0.009	0.002	-----
168-hr event	T09-13025	RTI	V	23	0.011	0.006	0.009	0.022	0.003	0.002	-----
168-hr event	T09-13025	RTI	Cr	24	0.017	0.004	0.007	0.007	0.001	0.001	-----
168-hr event	T09-13025	RTI	Mn	25	0.107	0.007	0.006	0.094	0.005	0.001	-----
168-hr event	T09-13025	RTI	Fe	26	2.236	0.113	0.007	2.228	0.113	0.002	1.970
168-hr event	T09-13025	RTI	Ni	28	0.017	0.002	0.004	0.008	0.001	0.002	-----
168-hr event	T09-13025	RTI	Cu	29	0.067	0.005	0.006	0.051	0.003	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	
168-hr event	T09-13025	RTI	Zn	30	0.482	0.025	0.006	0.412	0.021	0.001	0.415
168-hr event	T09-13025	RTI	As	33	0.026	0.006	0.008	0.032	0.003	0.006	-----
168-hr event	T09-13025	RTI	Se	34	0.046	0.006	0.009	0.034	0.002	0.001	-----
168-hr event	T09-13025	RTI	Br	35	0.295	0.018	0.008	0.323	0.017	0.001	0.312
168-hr event	T09-13025	RTI	Rb	37	0.000	0.003	0.009	0.012	0.004	0.002	-----
168-hr event	T09-13025	RTI	Sr	38	0.027	0.006	0.011	0.021	0.002	0.003	-----
168-hr event	T09-13025	RTI	Zr	40	0.000	0.020	0.080	0.005	0.003	0.005	-----
168-hr event	T09-13025	RTI	Pb	82	0.089	0.015	0.017	0.087	0.006	0.002	-----
152-hr event	T09-13037	DRI	Na	11	10.384	0.761	0.270	12.262	1.047	0.846	-----
152-hr event	T09-13037	DRI	Mg	12	0.343	0.152	0.103	0.583	0.147	0.274	-----
152-hr event	T09-13037	DRI	Al	13	1.676	0.036	0.023	2.229	0.152	0.133	1.850
152-hr event	T09-13037	DRI	Si	14	4.279	0.035	0.027	8.068	0.419	0.072	4.852
152-hr event	T09-13037	DRI	P	15	0.000	0.005	0.008	0.000	0.000	0.043	-----
152-hr event	T09-13037	DRI	S	16	44.436	0.159	0.022	43.896	2.201	0.026	43.584
152-hr event	T09-13037	DRI	Cl	17	0.142	0.005	0.006	0.000	0.000	0.015	-----
152-hr event	T09-13037	DRI	K	19	2.184	0.010	0.005	2.304	0.118	0.007	2.367
152-hr event	T09-13037	DRI	Ca	20	1.404	0.023	0.006	1.473	0.076	0.004	1.400
152-hr event	T09-13037	DRI	Ti	22	0.174	0.008	0.004	0.166	0.009	0.002	-----
152-hr event	T09-13037	DRI	V	23	0.023	0.005	0.000	0.022	0.003	0.001	-----
152-hr event	T09-13037	DRI	Cr	24	0.012	0.005	0.003	0.006	0.001	0.001	-----
152-hr event	T09-13037	DRI	Mn	25	0.127	0.016	0.007	0.136	0.007	0.001	-----
152-hr event	T09-13037	DRI	Fe	26	2.673	0.010	0.009	2.648	0.134	0.002	2.520
152-hr event	T09-13037	DRI	Ni	28	0.005	0.014	0.002	0.006	0.001	0.002	-----
152-hr event	T09-13037	DRI	Cu	29	0.042	0.018	0.003	0.048	0.003	0.002	-----
152-hr event	T09-13037	DRI	Zn	30	0.779	0.007	0.003	0.664	0.034	0.001	0.682
152-hr event	T09-13037	DRI	As	33	0.006	0.005	0.000	0.030	0.003	0.006	-----
152-hr event	T09-13037	DRI	Se	34	0.000	0.005	0.007	0.020	0.001	0.001	-----
152-hr event	T09-13037	DRI	Br	35	0.111	0.005	0.005	0.140	0.007	0.001	0.133
152-hr event	T09-13037	DRI	Rb	37	0.001	0.005	0.004	0.005	0.002	0.002	-----
152-hr event	T09-13037	DRI	Sr	38	0.020	0.005	0.007	0.014	0.002	0.003	-----
152-hr event	T09-13037	DRI	Zr	40	0.025	0.008	0.012	0.000	0.000	0.004	-----
152-hr event	T09-13037	DRI	Pb	82	0.084	0.006	0.009	0.091	0.006	0.002	-----
152-hr event	T09-13038	DRI	Na	11	12.544	0.833	0.270	7.717	0.736	0.864	-----
152-hr event	T09-13038	DRI	Mg	12	1.252	0.158	0.103	0.768	0.136	0.280	-----
152-hr event	T09-13038	DRI	Al	13	1.814	0.037	0.023	2.345	0.158	0.136	1.850
152-hr event	T09-13038	DRI	Si	14	4.099	0.034	0.027	7.969	0.417	0.074	4.852
152-hr event	T09-13038	DRI	P	15	0.000	0.005	0.008	0.000	0.000	0.044	-----
152-hr event	T09-13038	DRI	S	16	47.058	0.168	0.022	44.946	2.254	0.027	43.584
152-hr event	T09-13038	DRI	Cl	17	0.142	0.005	0.006	0.000	0.000	0.016	-----
152-hr event	T09-13038	DRI	K	19	2.318	0.010	0.005	2.402	0.122	0.007	2.367
152-hr event	T09-13038	DRI	Ca	20	1.410	0.023	0.006	1.552	0.080	0.004	1.400
152-hr event	T09-13038	DRI	Ti	22	0.154	0.008	0.004	0.166	0.009	0.002	-----
152-hr event	T09-13038	DRI	V	23	0.021	0.005	0.000	0.019	0.003	0.002	-----
152-hr event	T09-13038	DRI	Cr	24	0.022	0.005	0.003	0.014	0.001	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	
152-hr event	T09-13038	DRI	Mn	25	0.136	0.016	0.007	0.133	0.007	0.001	-----
152-hr event	T09-13038	DRI	Fe	26	2.822	0.011	0.009	2.724	0.138	0.002	2.520
152-hr event	T09-13038	DRI	Ni	28	0.006	0.014	0.002	0.010	0.001	0.002	-----
152-hr event	T09-13038	DRI	Cu	29	0.049	0.018	0.003	0.052	0.003	0.002	-----
152-hr event	T09-13038	DRI	Zn	30	0.763	0.007	0.003	0.672	0.034	0.001	0.682
152-hr event	T09-13038	DRI	As	33	0.017	0.005	0.000	0.033	0.003	0.006	-----
152-hr event	T09-13038	DRI	Se	34	0.000	0.005	0.007	0.020	0.001	0.001	-----
152-hr event	T09-13038	DRI	Br	35	0.101	0.005	0.005	0.140	0.007	0.001	0.133
152-hr event	T09-13038	DRI	Rb	37	0.001	0.005	0.004	0.008	0.002	0.002	-----
152-hr event	T09-13038	DRI	Sr	38	0.028	0.005	0.007	0.017	0.002	0.003	-----
152-hr event	T09-13038	DRI	Zr	40	0.009	0.008	0.012	0.000	0.000	0.005	-----
152-hr event	T09-13038	DRI	Pb	82	0.076	0.006	0.009	0.084	0.006	0.002	-----
152-hr event	T09-13039	RTI	Na	11	5.411	0.453	0.065	13.545	1.217	0.876	-----
152-hr event	T09-13039	RTI	Mg	12	0.519	0.045	0.024	0.000	0.000	0.285	-----
152-hr event	T09-13039	RTI	Al	13	1.900	0.143	0.051	2.601	0.176	0.139	1.850
152-hr event	T09-13039	RTI	Si	14	5.069	0.338	0.027	7.554	0.397	0.075	4.852
152-hr event	T09-13039	RTI	P	15	0.151	0.026	0.010	0.000	0.000	0.045	-----
152-hr event	T09-13039	RTI	S	16	43.468	2.177	0.013	44.311	2.222	0.027	43.584
152-hr event	T09-13039	RTI	Cl	17	0.290	0.019	0.009	0.000	0.000	0.016	-----
152-hr event	T09-13039	RTI	K	19	2.624	0.132	0.009	2.405	0.123	0.007	2.367
152-hr event	T09-13039	RTI	Ca	20	1.373	0.069	0.010	1.537	0.079	0.004	1.400
152-hr event	T09-13039	RTI	Ti	22	0.146	0.014	0.013	0.172	0.010	0.002	-----
152-hr event	T09-13039	RTI	V	23	0.014	0.007	0.009	0.018	0.003	0.002	-----
152-hr event	T09-13039	RTI	Cr	24	0.017	0.005	0.007	0.006	0.001	0.001	-----
152-hr event	T09-13039	RTI	Mn	25	0.138	0.009	0.006	0.125	0.007	0.001	-----
152-hr event	T09-13039	RTI	Fe	26	2.664	0.134	0.007	2.654	0.134	0.002	2.520
152-hr event	T09-13039	RTI	Ni	28	0.012	0.002	0.004	0.006	0.001	0.002	-----
152-hr event	T09-13039	RTI	Cu	29	0.062	0.004	0.006	0.048	0.003	0.002	-----
152-hr event	T09-13039	RTI	Zn	30	0.785	0.040	0.006	0.651	0.033	0.001	0.682
152-hr event	T09-13039	RTI	As	33	0.017	0.007	0.008	0.030	0.003	0.006	-----
152-hr event	T09-13039	RTI	Se	34	0.032	0.006	0.009	0.020	0.001	0.001	-----
152-hr event	T09-13039	RTI	Br	35	0.129	0.010	0.008	0.137	0.007	0.001	0.133
152-hr event	T09-13039	RTI	Rb	37	0.003	0.005	0.009	0.011	0.002	0.002	-----
152-hr event	T09-13039	RTI	Sr	38	0.020	0.006	0.011	0.018	0.002	0.003	-----
152-hr event	T09-13039	RTI	Zr	40	0.000	0.020	0.080	0.006	0.002	0.005	-----
152-hr event	T09-13039	RTI	Pb	82	0.106	0.016	0.017	0.090	0.006	0.002	-----
152-hr event	T09-13040	RTI	Na	11	5.038	0.422	0.065	7.336	0.761	0.848	-----
152-hr event	T09-13040	RTI	Mg	12	0.399	0.038	0.024	0.712	0.118	0.274	-----
152-hr event	T09-13040	RTI	Al	13	1.924	0.145	0.051	2.665	0.174	0.134	1.850
152-hr event	T09-13040	RTI	Si	14	5.034	0.335	0.027	7.916	0.414	0.073	4.852
152-hr event	T09-13040	RTI	P	15	0.172	0.026	0.010	0.000	0.000	0.044	-----
152-hr event	T09-13040	RTI	S	16	41.513	2.079	0.013	44.283	2.221	0.026	43.584
152-hr event	T09-13040	RTI	Cl	17	0.223	0.016	0.009	0.000	0.000	0.015	-----
152-hr event	T09-13040	RTI	K	19	2.514	0.126	0.009	2.385	0.122	0.007	2.367

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	
152-hr event	T09-13040	RTI	Ca	20	1.339	0.068	0.010	1.607	0.083	0.004	1.400
152-hr event	T09-13040	RTI	Ti	22	0.161	0.014	0.013	0.169	0.010	0.002	-----
152-hr event	T09-13040	RTI	V	23	0.024	0.007	0.009	0.034	0.006	0.002	-----
152-hr event	T09-13040	RTI	Cr	24	0.000	0.004	0.007	0.005	0.001	0.001	-----
152-hr event	T09-13040	RTI	Mn	25	0.136	0.009	0.006	0.136	0.008	0.001	-----
152-hr event	T09-13040	RTI	Fe	26	2.667	0.134	0.007	2.772	0.140	0.002	2.520
152-hr event	T09-13040	RTI	Ni	28	0.010	0.002	0.004	0.006	0.001	0.002	-----
152-hr event	T09-13040	RTI	Cu	29	0.062	0.004	0.006	0.048	0.003	0.002	-----
152-hr event	T09-13040	RTI	Zn	30	0.753	0.038	0.006	0.682	0.035	0.001	0.682
152-hr event	T09-13040	RTI	As	33	0.025	0.007	0.008	0.030	0.003	0.005	-----
152-hr event	T09-13040	RTI	Se	34	0.015	0.006	0.009	0.021	0.002	0.001	-----
152-hr event	T09-13040	RTI	Br	35	0.134	0.010	0.008	0.142	0.008	0.001	0.133
152-hr event	T09-13040	RTI	Rb	37	0.010	0.006	0.009	0.006	0.002	0.002	-----
152-hr event	T09-13040	RTI	Sr	38	0.024	0.006	0.011	0.020	0.002	0.003	-----
152-hr event	T09-13040	RTI	Zr	40	0.000	0.020	0.080	0.000	0.000	0.004	-----
152-hr event	T09-13040	RTI	Pb	82	0.100	0.016	0.017	0.090	0.006	0.002	-----
blank filter	T09-13052	DRI	Na	11	0.053	0.446	0.270	0.566	0.143	0.233	-----
blank filter	T09-13052	DRI	Mg	12	0.000	0.149	0.103	0.000	0.000	0.076	-----
blank filter	T09-13052	DRI	Al	13	0.024	0.029	0.023	0.086	0.018	0.037	-----
blank filter	T09-13052	DRI	Si	14	0.000	0.019	0.027	0.000	0.000	0.019	-----
blank filter	T09-13052	DRI	P	15	0.001	0.005	0.008	0.000	0.000	0.011	-----
blank filter	T09-13052	DRI	S	16	0.000	0.005	0.022	0.000	0.000	0.008	-----
blank filter	T09-13052	DRI	Cl	17	0.009	0.005	0.006	0.000	0.000	0.006	-----
blank filter	T09-13052	DRI	K	19	0.016	0.007	0.005	0.031	0.005	0.004	-----
blank filter	T09-13052	DRI	Ca	20	0.043	0.020	0.006	0.011	0.002	0.002	-----
blank filter	T09-13052	DRI	Ti	22	0.000	0.008	0.004	0.000	0.000	0.001	-----
blank filter	T09-13052	DRI	V	23	0.000	0.005	0.000	0.003	0.001	0.001	-----
blank filter	T09-13052	DRI	Cr	24	0.000	0.005	0.003	0.001	0.001	0.001	-----
blank filter	T09-13052	DRI	Mn	25	0.009	0.015	0.007	0.000	0.000	0.001	-----
blank filter	T09-13052	DRI	Fe	26	0.000	0.005	0.009	0.002	0.000	0.001	-----
blank filter	T09-13052	DRI	Ni	28	0.000	0.014	0.002	0.000	0.000	0.001	-----
blank filter	T09-13052	DRI	Cu	29	0.000	0.018	0.003	0.000	0.000	0.001	-----
blank filter	T09-13052	DRI	Zn	30	0.000	0.005	0.003	0.002	0.001	0.001	-----
blank filter	T09-13052	DRI	As	33	0.000	0.005	0.000	0.001	0.000	0.000	-----
blank filter	T09-13052	DRI	Se	34	0.000	0.005	0.007	0.001	0.001	0.001	-----
blank filter	T09-13052	DRI	Br	35	0.000	0.005	0.005	0.000	0.000	0.001	-----
blank filter	T09-13052	DRI	Rb	37	0.000	0.005	0.004	0.002	0.002	0.002	-----
blank filter	T09-13052	DRI	Sr	38	0.000	0.005	0.007	0.000	0.000	0.003	-----
blank filter	T09-13052	DRI	Zr	40	0.000	0.008	0.012	0.000	0.000	0.004	-----
blank filter	T09-13052	DRI	Pb	82	0.000	0.006	0.009	0.000	0.000	0.001	-----
blank filter	T09-13053	DRI	Na	11	0.000	0.442	0.270	0.253	0.093	0.232	-----
blank filter	T09-13053	DRI	Mg	12	0.051	0.150	0.103	0.000	0.000	0.074	-----
blank filter	T09-13053	DRI	Al	13	0.000	0.029	0.023	0.000	0.000	0.035	-----
blank filter	T09-13053	DRI	Si	14	0.001	0.019	0.027	0.000	0.000	0.018	-----

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	T09-13053	DRI	P	15	0.002	0.005	0.008	0.080	0.018	0.011	-----
blank filter	T09-13053	DRI	S	16	0.000	0.005	0.022	0.024	0.004	0.008	-----
blank filter	T09-13053	DRI	Cl	17	0.002	0.005	0.006	0.000	0.000	0.006	-----
blank filter	T09-13053	DRI	K	19	0.000	0.007	0.005	0.000	0.000	0.004	-----
blank filter	T09-13053	DRI	Ca	20	0.015	0.020	0.006	0.000	0.000	0.002	-----
blank filter	T09-13053	DRI	Ti	22	0.000	0.008	0.004	0.002	0.001	0.001	-----
blank filter	T09-13053	DRI	V	23	0.001	0.005	0.000	0.000	0.000	0.001	-----
blank filter	T09-13053	DRI	Cr	24	0.000	0.005	0.003	0.000	0.000	0.001	-----
blank filter	T09-13053	DRI	Mn	25	0.004	0.015	0.007	0.000	0.000	0.001	-----
blank filter	T09-13053	DRI	Fe	26	0.000	0.005	0.009	0.002	0.000	0.001	-----
blank filter	T09-13053	DRI	Ni	28	0.000	0.014	0.002	0.000	0.000	0.001	-----
blank filter	T09-13053	DRI	Cu	29	0.000	0.018	0.003	0.000	0.000	0.001	-----
blank filter	T09-13053	DRI	Zn	30	0.000	0.005	0.003	0.000	0.000	0.001	-----
blank filter	T09-13053	DRI	As	33	0.000	0.005	0.000	0.000	0.000	0.000	-----
blank filter	T09-13053	DRI	Se	34	0.000	0.005	0.007	0.000	0.000	0.001	-----
blank filter	T09-13053	DRI	Br	35	0.000	0.005	0.005	0.000	0.000	0.001	-----
blank filter	T09-13053	DRI	Rb	37	0.000	0.005	0.004	0.000	0.000	0.002	-----
blank filter	T09-13053	DRI	Sr	38	0.000	0.005	0.007	0.002	0.001	0.002	-----
blank filter	T09-13053	DRI	Zr	40	0.000	0.008	0.012	0.000	0.000	0.004	-----
blank filter	T09-13053	DRI	Pb	82	0.000	0.006	0.009	0.004	0.001	0.001	-----
blank filter	T09-13054	RTI	Na	11	0.000	0.028	0.065	0.000	0.000	0.220	-----
blank filter	T09-13054	RTI	Mg	12	0.000	0.007	0.024	0.108	0.034	0.069	-----
blank filter	T09-13054	RTI	Al	13	0.006	0.015	0.051	0.000	0.000	0.032	-----
blank filter	T09-13054	RTI	Si	14	0.000	0.011	0.027	0.059	0.011	0.017	-----
blank filter	T09-13054	RTI	P	15	0.000	0.005	0.010	0.000	0.000	0.010	-----
blank filter	T09-13054	RTI	S	16	0.000	0.005	0.013	0.000	0.000	0.007	-----
blank filter	T09-13054	RTI	Cl	17	0.000	0.003	0.009	0.000	0.000	0.005	-----
blank filter	T09-13054	RTI	K	19	0.000	0.003	0.009	0.000	0.000	0.004	-----
blank filter	T09-13054	RTI	Ca	20	0.000	0.003	0.010	0.000	0.000	0.001	-----
blank filter	T09-13054	RTI	Ti	22	0.000	0.006	0.013	0.002	0.000	0.001	-----
blank filter	T09-13054	RTI	V	23	0.001	0.005	0.009	0.000	0.000	0.000	-----
blank filter	T09-13054	RTI	Cr	24	0.000	0.003	0.007	0.001	0.000	0.000	-----
blank filter	T09-13054	RTI	Mn	25	0.000	0.003	0.006	0.000	0.000	0.001	-----
blank filter	T09-13054	RTI	Fe	26	0.000	0.002	0.007	0.001	0.000	0.001	-----
blank filter	T09-13054	RTI	Ni	28	0.000	0.001	0.004	0.000	0.000	0.001	-----
blank filter	T09-13054	RTI	Cu	29	0.000	0.001	0.006	0.000	0.000	0.001	-----
blank filter	T09-13054	RTI	Zn	30	0.000	0.001	0.006	0.000	0.000	0.001	-----
blank filter	T09-13054	RTI	As	33	0.000	0.002	0.008	0.000	0.000	0.000	-----
blank filter	T09-13054	RTI	Se	34	0.003	0.005	0.009	0.000	0.000	0.001	-----
blank filter	T09-13054	RTI	Br	35	0.003	0.005	0.008	0.001	0.000	0.001	-----
blank filter	T09-13054	RTI	Rb	37	0.000	0.004	0.009	0.000	0.000	0.002	-----
blank filter	T09-13054	RTI	Sr	38	0.006	0.005	0.011	0.001	0.001	0.002	-----
blank filter	T09-13054	RTI	Zr	40	0.000	0.020	0.080	0.000	0.000	0.004	-----
blank filter	T09-13054	RTI	Pb	82	0.000	0.007	0.017	0.003	0.001	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	
blank filter	T09-13055	RTI	Na	11	0.000	0.028	0.065	0.000	0.000	0.225	-----
blank filter	T09-13055	RTI	Mg	12	0.000	0.007	0.024	0.000	0.000	0.071	-----
blank filter	T09-13055	RTI	Al	13	0.000	0.020	0.051	0.000	0.000	0.034	-----
blank filter	T09-13055	RTI	Si	14	0.000	0.011	0.027	0.030	0.008	0.017	-----
blank filter	T09-13055	RTI	P	15	0.000	0.005	0.010	0.000	0.000	0.010	-----
blank filter	T09-13055	RTI	S	16	0.000	0.005	0.013	0.027	0.007	0.007	-----
blank filter	T09-13055	RTI	Cl	17	0.000	0.003	0.009	0.014	0.003	0.005	-----
blank filter	T09-13055	RTI	K	19	0.000	0.003	0.009	0.000	0.000	0.004	-----
blank filter	T09-13055	RTI	Ca	20	0.000	0.003	0.010	0.000	0.000	0.001	-----
blank filter	T09-13055	RTI	Ti	22	0.002	0.007	0.013	0.000	0.000	0.001	-----
blank filter	T09-13055	RTI	V	23	0.002	0.005	0.009	0.000	0.000	0.001	-----
blank filter	T09-13055	RTI	Cr	24	0.005	0.003	0.007	0.001	0.000	0.000	-----
blank filter	T09-13055	RTI	Mn	25	0.000	0.003	0.006	0.001	0.000	0.001	-----
blank filter	T09-13055	RTI	Fe	26	0.000	0.002	0.007	0.004	0.001	0.001	-----
blank filter	T09-13055	RTI	Ni	28	0.001	0.002	0.004	0.000	0.000	0.001	-----
blank filter	T09-13055	RTI	Cu	29	0.003	0.002	0.006	0.000	0.000	0.001	-----
blank filter	T09-13055	RTI	Zn	30	0.000	0.001	0.006	0.002	0.000	0.001	-----
blank filter	T09-13055	RTI	As	33	0.000	0.002	0.008	0.000	0.000	0.000	-----
blank filter	T09-13055	RTI	Se	34	0.004	0.005	0.009	0.000	0.000	0.001	-----
blank filter	T09-13055	RTI	Br	35	0.000	0.002	0.008	0.000	0.000	0.001	-----
blank filter	T09-13055	RTI	Rb	37	0.000	0.002	0.009	0.000	0.000	0.002	-----
blank filter	T09-13055	RTI	Sr	38	0.000	0.002	0.011	0.002	0.001	0.002	-----
blank filter	T09-13055	RTI	Zr	40	0.003	0.038	0.080	0.000	0.000	0.004	-----
blank filter	T09-13055	RTI	Pb	82	0.000	0.005	0.017	0.007	0.002	0.001	-----

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