

## TECHNICAL MEMORANDUM

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**FROM:** Michael S. Clark / NAREL  
**COPY:** Michael Miguel / CARB  
Dennis Mikel / OAQPS  
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**DATE:** September 12, 2002  
**SUBJECT:** Performance Evaluation - CARB Laboratories

### Introduction

A study has been conducted as part of the QA oversight for the PM<sub>2.5</sub> Speciation Trends Network (STN). The purpose of this study was to evaluate specific laboratory performance at the California Air Resources Board (CARB) facilities located in Sacramento. CARB has elected to implement STN protocols at their own laboratory facilities so that many of the PM<sub>2.5</sub> speciation samples collected within the state can be analyzed locally. Most states use laboratories at the Research Triangle Institute which operates under a federal contract to analyze STN samples.

Performance Evaluation (PE) samples were prepared at the National Air and Radiation Environmental Laboratory (NAREL) and submitted to CARB for analysis. The PE samples consisted of the following components.

- Gravimetric Mass Analysis - ten Teflon® filters and three metallic weights previously tared at CARB.
- Ion Chromatography (IC) Analysis - six Nylon® filters, three anion spike solutions, and three cation spike solutions.
- TOT Carbon Analysis - six Quartz filters and three spike solutions.
- XRF Elemental Analysis - ten well characterized Teflon® filters

Detailed instructions for analyzing and reporting the PE samples were provided by NAREL. The analytical facilities at NAREL are similar to those at CARB. Each PE sample, or a replicate of the PE sample, was also analyzed at NAREL. This report will discuss the analytical results reported by CARB and will compare each result to an expected value.

Mass determination typically proceeds by weighing the Teflon® collection filter before and after the sampling event. The amount of Particulate Matter (PM<sub>2.5</sub>) captured onto the surface of the filter can be calculated by a simple subtraction of the tare weight from the loaded filter weight. CARB routinely provides clean pre-weighed air filters to the various field sites within the state. At the field site, an approved sampling device must be used to sample the air and deposit the very fine PM<sub>2.5</sub>

onto the collection filter. The filter is then returned to CARB where the gravimetric analysis is completed.

CARB also provides clean Nylon® filters to the various field sites. The Nylon® filter is used to capture PM<sub>2.5</sub> 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.

CARB routinely provides clean quartz filters to the various field sites. The quartz filter is used to capture PM<sub>2.5</sub> for subsequent carbon analysis. A thermal/optical technique is used at CARB 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 through the sample. The oven is programmed to heat the quartz filter material to release captured PM<sub>2.5</sub>. Carbon components released from the filter are swept through the oven by a controlled purge gas. The carbon released from the filter is 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 organic carbon (OC), elemental carbon (EC), and carbonate carbon (CC) all of which may be added together to calculate the total carbon (TC). The instrument at CARB is slightly different from the instrument at NAREL, and those differences shall be discussed later in the carbon analysis section of this report

Following the gravimetric analysis, a Teflon® filter is normally submitted for elemental analysis using x-ray fluorescence (XRF). Several elements which may be present in the captured PM<sub>2.5</sub> are determined by the XRF technique. During the analysis, the filter is exposed to x-rays which will excite the atoms in the sample to fluoresce. A solid state detector connected to a multichannel analyzer is used to monitor and record the sample fluorescence for several seconds and produce a spectrum. The sample spectrum is compared to spectra of known standards. Interpretation of the sample spectrum provides quantitative results for elements captured from the air. For this study, ten well characterized filters were available for the elemental analysis. These ten samples have been analyzed at several program laboratories and therefore provide a basis for inter-laboratory comparisons.

### **Gravimetric Analysis**

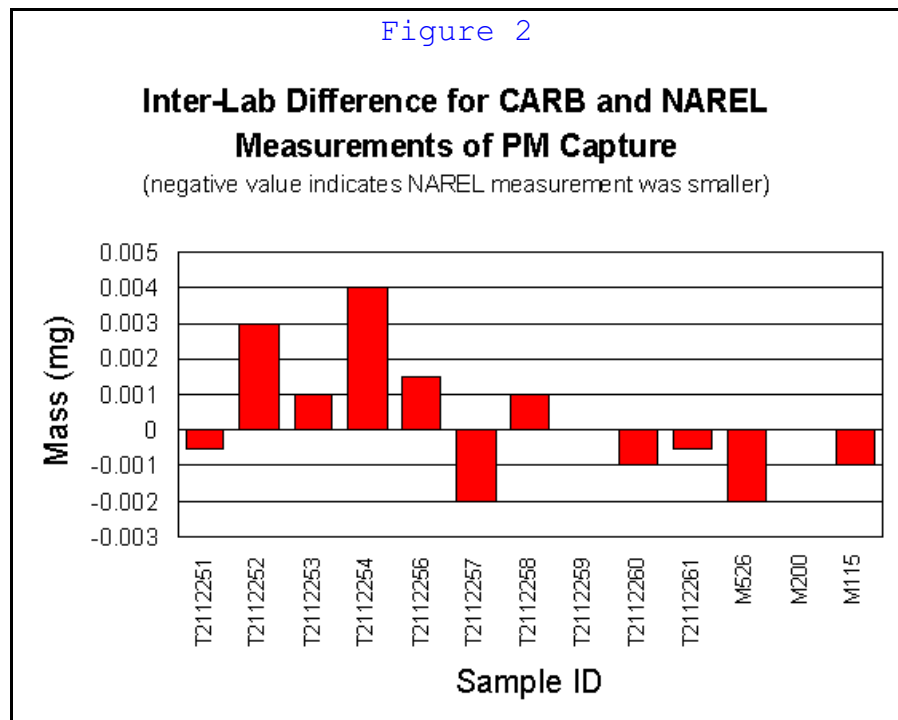
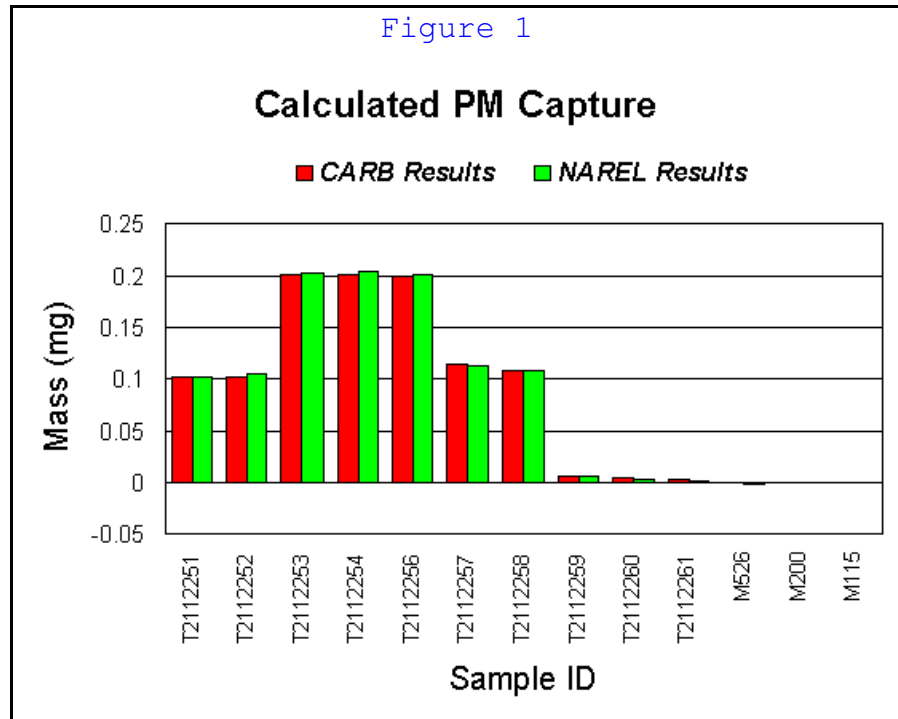
NAREL provided ten new Teflon® filters and three metallic weights for this study. Metallic weights were included in this study to provide a material which is not as susceptible to problems with electrical static as the true filter material. The filters and the weights were shipped to CARB with a request to determine tare mass using local standard procedures. After tare mass had been determined at CARB, the filters and metallic weights were shipped to NAREL in Montgomery, AL. The filters and the weights were immediately placed into the weighing chamber at NAREL for equilibration and determination of a NAREL tare mass. After the NAREL tare mass was determined, the filters were loaded with PM<sub>2.5</sub> captured from the outside air near NAREL. A Met One SASS air sampler was used to load seven of the filters, and the remaining three filters were utilized as blanks. Following sample collection, all filters and weights were returned to the weighing chamber at NAREL to equilibrate and to determine the loaded mass. Finally, the ten filters and three metallic weights were shipped back to CARB for their routine gravimetric determination of PM<sub>2.5</sub> capture.

## Gravimetric Results

The results of 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 three metallic weights.

Figure 2 presents the inter-laboratory differences. Inter-laboratory differences were calculated by subtracting the  $PM_{2.5}$  capture value determined at CARB 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 raw data reported from both laboratories have been tabulated for easy viewing. At the end of this report, Table 1 includes the results of ten shared filters and three metallic weights. Table 1 contains the tare weight, the final weight, and the calculated  $PM_{2.5}$  capture. Table 1 also contains the calculated inter-laboratory difference for measuring the  $PM_{2.5}$  capture which is graphed in Figure 2.



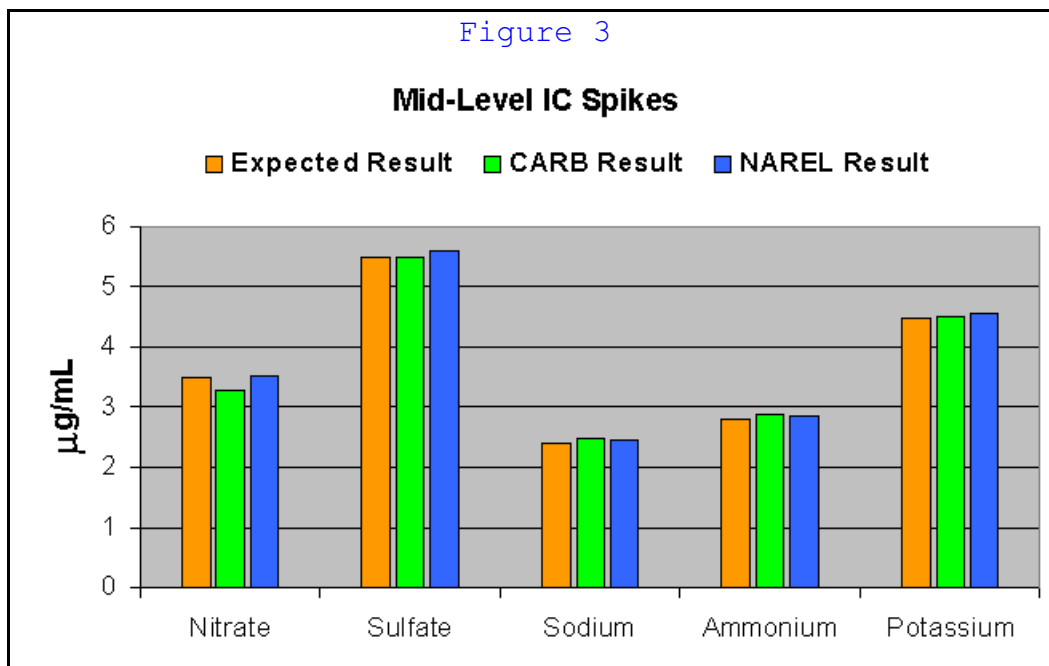
## IC Analysis

For this study, Nylon® filters and IC spike solutions were carefully prepared at NAREL and shipped to CARB for analysis. A Met One SASS sampler was used to load several Nylon® filters with PM<sub>2.5</sub> captured from the Montgomery air. Six filters were submitted to CARB for analysis, and replicates of each filter were retained at NAREL for in-house analysis. Six IC spike solutions were also prepared at NAREL. Each solution was designed for dilution by a factor of ten using reagent water available at the receiving laboratory. After dilution to full volume, each spike solution was utilized as the solvent to extract a clean blank filter also provided by the receiving laboratory. The filter extracts were analyzed using appropriate IC instrumentation available at the receiving laboratory. The results reported for each sample were based upon the concentration of analyte present in the final extract.

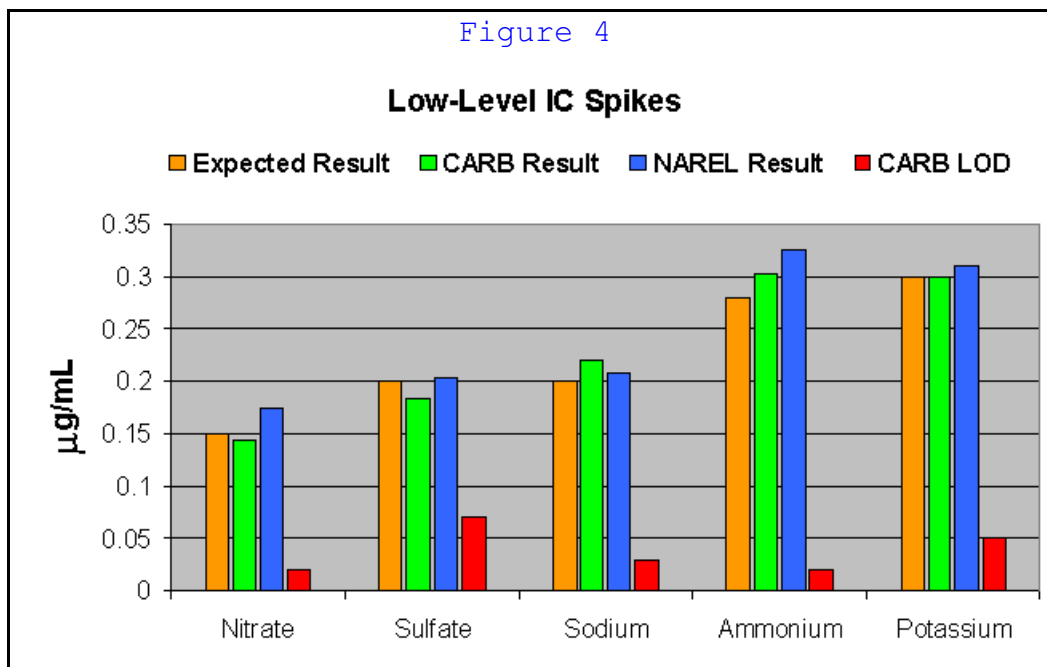
Two of the six filters submitted to CARB were actually Nylon® filter blanks. Two of the filters were replicates loaded with a 51-hour sampling event, and two filters were replicates loaded with a 96-hour event. Samples were collected over long periods to insure that all analytes were present in the samples at detectable levels. No information was given to CARB regarding the history of these Nylon® filters. Three of the six IC spike solutions were prepared for analysis of the anions, and three solutions were prepared for the analysis of cations. These solutions were designed to offer a mid-level concentration, a low-level concentration, and a blank for each analyte. Replicates of all samples were analyzed at NAREL following the same instructions provided to CARB.

## IC Results

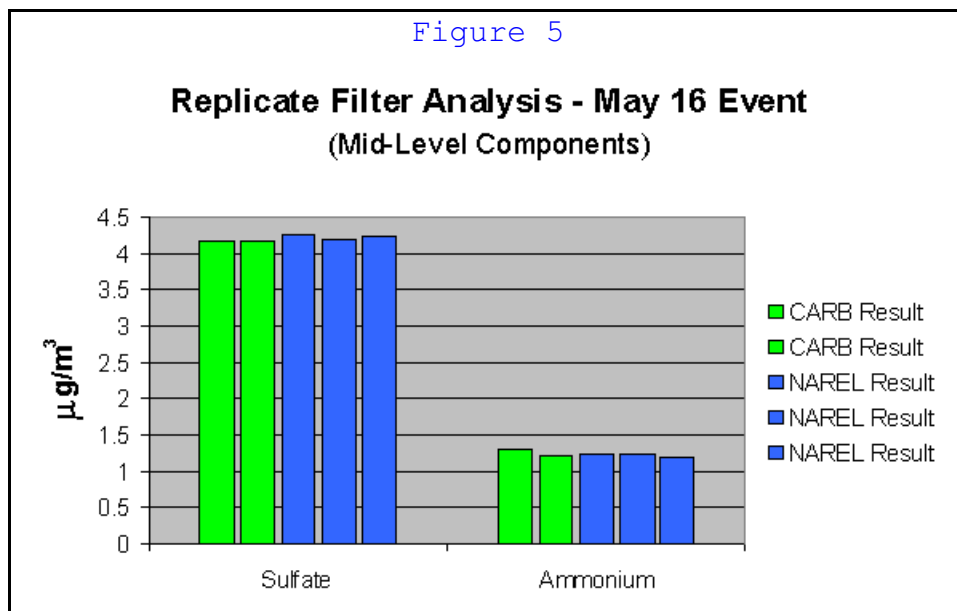
Results for the mid-level IC spikes are presented as a bar graph in Figure 3. For each analyte, the mid-level concentration of the fully diluted spike solution was between 2 and 6 µg/mL. Figure 3 presents the expected result, the CARB result, and the NAREL result for each analyte.



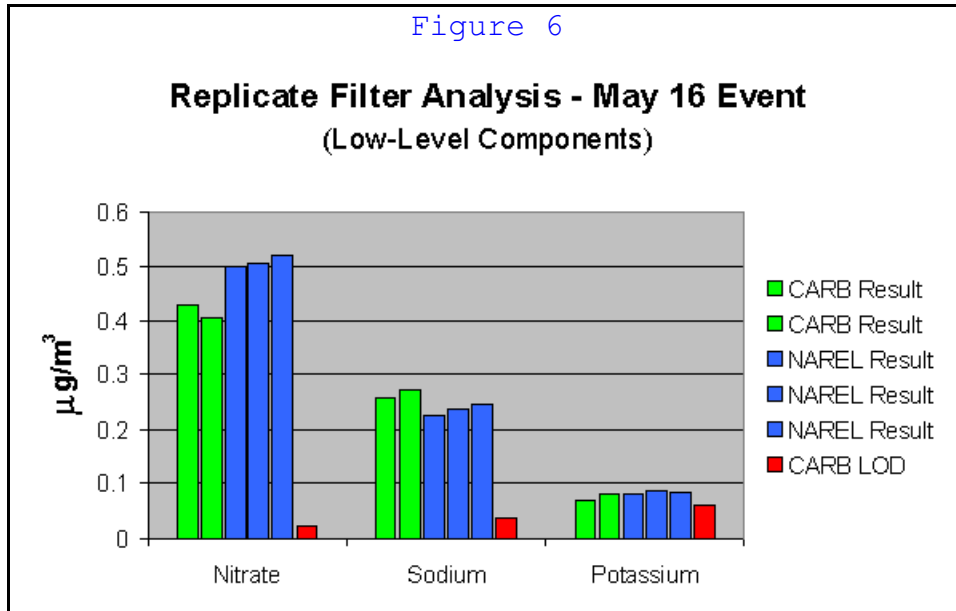
Results for the low-level spikes are presented as a bar graph in Figure 4. For each analyte, the low-level concentration of the fully diluted spike solution was between 0.15 and 0.3  $\mu\text{g}/\text{mL}$ . Since the concentrations presented in Figure 4 are low, an extra bar was added to this graph showing the Limit of Detection (LOD) reported by CARB. The results from the IC spike solutions are summarized in Table 2 at the end of this report.



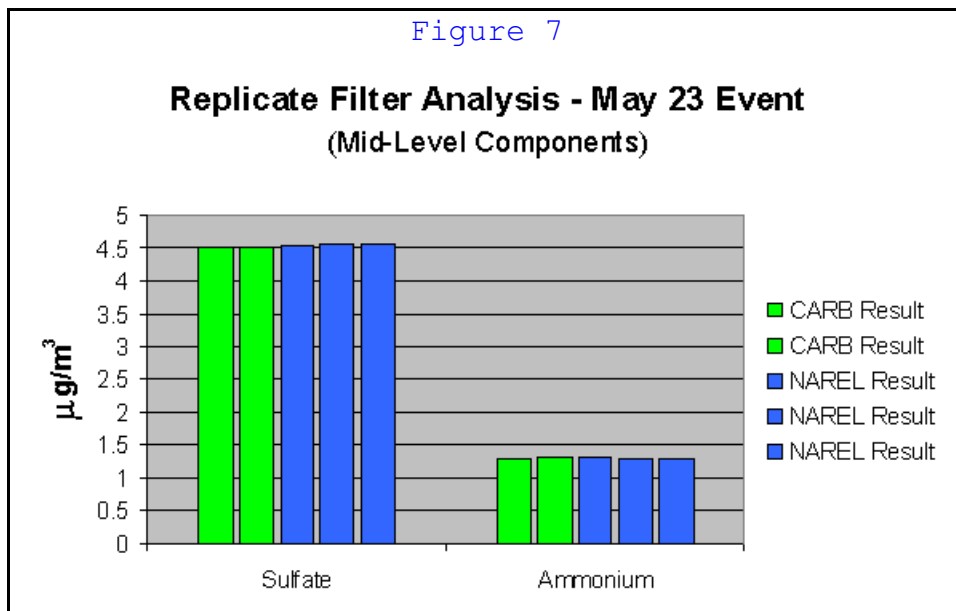
Results for five replicate filters are presented in Figure 5 and Figure 6. These filters were loaded with a 51-hour sampling event which began on May 16. Only two of these five Nylon® filter replicates were submitted to CARB for analysis, and the remaining three replicates were extracted and analyzed at NAREL. Sulfate and ammonium were the most abundant analytes captured from the Montgomery air during this sampling event, and these ions are plotted in Figure 5.



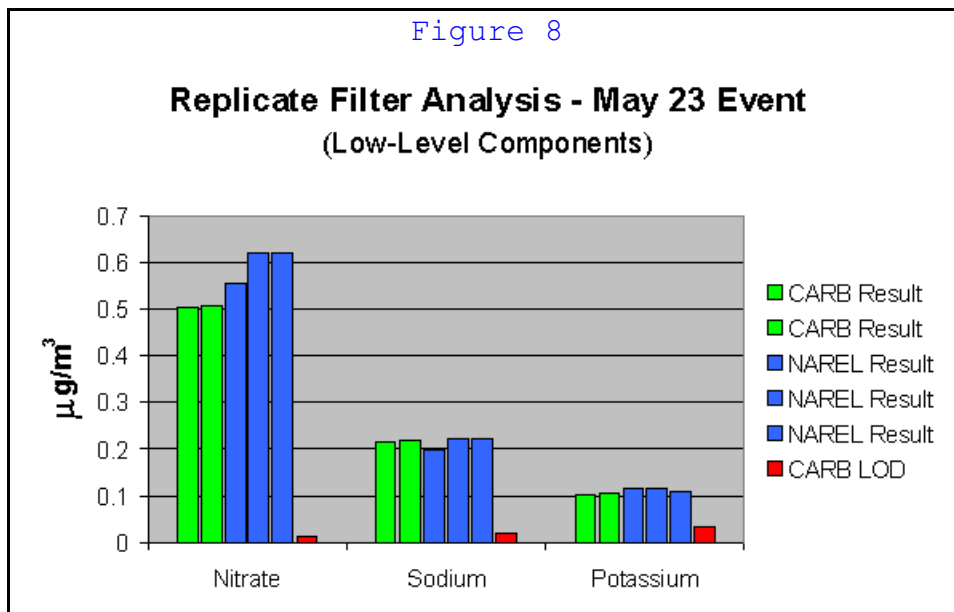
Nitrate, sodium, and potassium were present in the PM capture at lower concentrations, and these three ions are plotted in Figure 6. Since the concentrations presented in Figure 6 are relatively low, an extra bar was added to this graph showing CARB's LOD expressed as mass per cubic meter of air sampled.



Results for five more replicate filters are presented in Figure 7 and Figure 8. These filters were loaded with a 96-hour sampling event which began on May 23. Once again, only two of these five Nylon® filter replicates were submitted to CARB for analysis, and the remaining three replicates were extracted and analyzed at NAREL. As observed in the previous event, the most abundant analytes were sulfate and ammonium which are plotted in Figure 7.



Nitrate, sodium, and potassium were present at low concentration during the May 23 event, and these three ions are plotted in Figure 8.



Results for all of the loaded Nylon® filters are presented in Table 3 and Table 4 at the end of this report. Two of the six Nylon® filters submitted to CARB for analysis were actually blank filters which were pre-cleaned at NAREL along with all the other Nylon® filters used in this study. The results for all blank Nylon® filters are presented in Table 5 at the end of this report.

### Carbon Analysis

Earlier in the introduction of this report, it was stated that carbon analysis at CARB is slightly different from the carbon analysis at NAREL. The carbon analyzer at NAREL was manufactured by Sunset Laboratories, and the carbon analyzer at CARB is a DRI Model 2001 manufactured by Atmoslytic Incorporated. The Sunset instrument uses a Thermal Optical Transmittance (TOT) technique which heats the sample while monitoring the laser light that passes through the sample. The DRI Model 2001 heats the sample while monitoring two types of laser light: [1] light which passes through the sample and also [2] light which reflects from the sample. The DRI Model 2001 can be programmed to provide a TOT analysis or an analysis based upon Thermal Optical Reflectance (TOR). The Research Triangle Institute uses the Sunset instrument to provide a TOT analysis for the samples collected by the Speciation Trends Network.

For this study, quartz filters and TOT spike solutions were carefully prepared at NAREL and shipped to CARB for analysis. A Met One SASS sampler was used to load several quartz filters with PM<sub>2.5</sub> captured from the Montgomery air. Six filters were submitted to CARB for analysis, and replicates of each filter were retained at NAREL for in-house analysis. Two of the six filters submitted to CARB were actually quartz filter blanks, two filters were replicates of a 48-hour sampling event which began on June 3, and two filters were replicates of a 94-hour sampling event

which began on June 7. No information was given to CARB regarding the history of the quartz filters. A routine analysis of each filter was requested.

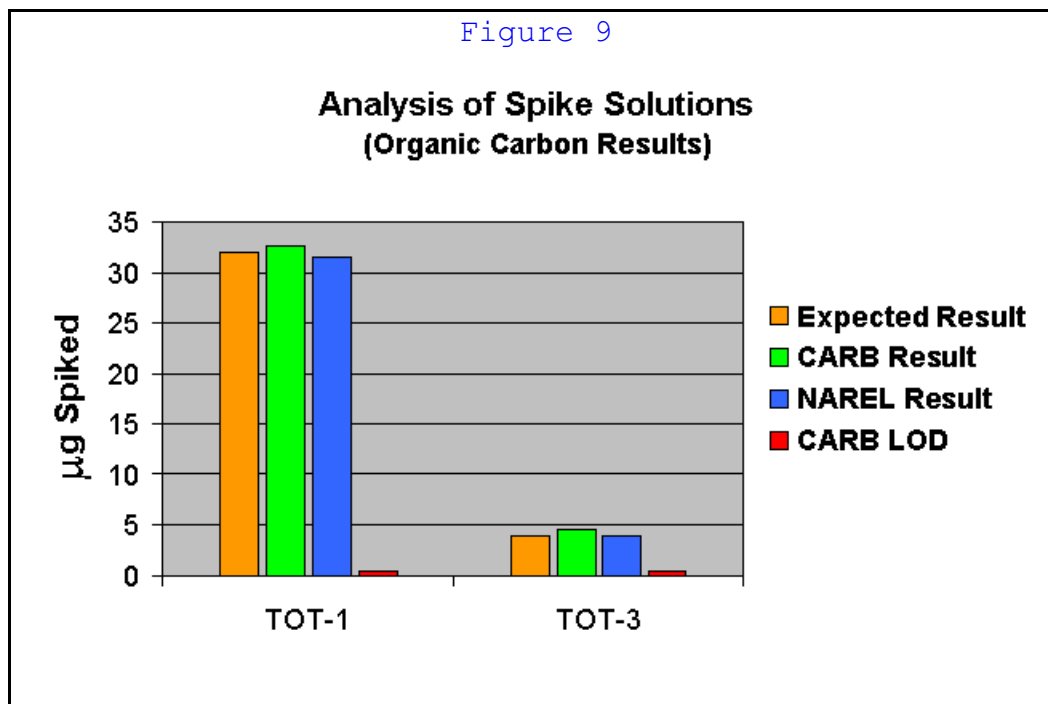
Three TOT spike solutions were also prepared at NAREL. One solution was blank water, one solution provided a low-level concentration of sucrose, and one solution contained a mid-level concentration of sucrose. No information was given to CARB regarding the composition of the spike solutions. The instructions for spiking and analyzing each solution are repeated here.

*Pre-clean a standard-size punch from a blank quartz filter using the TOT instrument oven program. After the punch has cooled carefully spike 10.0  $\mu\text{L}$  of the PE solution onto the clean quartz punch. Allow the solvent to evaporate from the punch, and then analyze the punch. This procedure should be similar to the daily and weekly calibration checks using a known concentration of sucrose.*

The final results from CARB were reported as mass of carbon per square centimeter of filter material ( $\mu\text{g}/\text{cm}^2$ ). Once received at NAREL, the results from the loaded filter were converted to mass of carbon per cubic meter of air sampled.

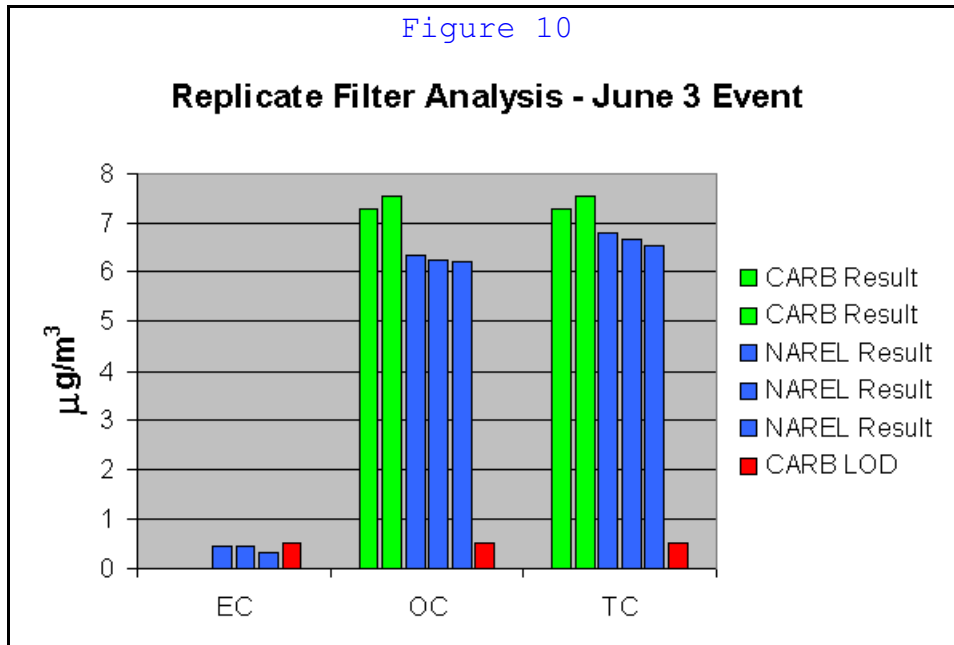
### Carbon Results

Results for the blind TOT spike solutions are presented as a bar graph in Figure 9. TOT-1 was a mid-level sucrose spike, TOT-3 was a low-level sucrose spike, and TOT-2 (not shown in the graph) was blank water. Figure 9 presents the expected result, the CARB result, the NAREL result, and the Limit of Detection (LOD) reported by CARB for the organic carbon analysis. All results reported for the three TOT spike solutions are presented in Table 6 at the end of this report.

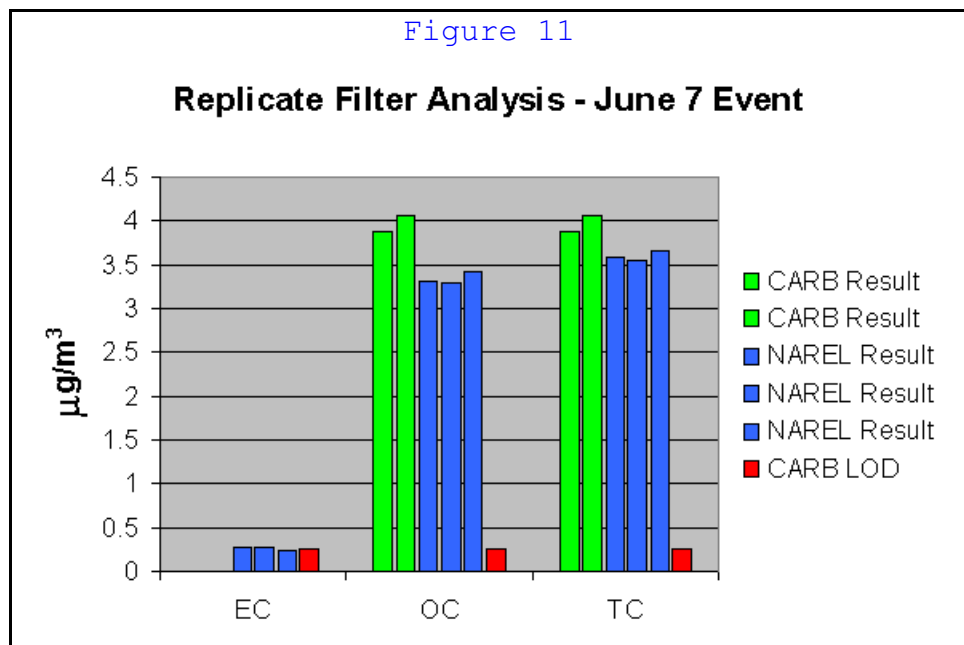




Results for five replicate filters are presented in Figure 10. These filters were loaded with a 48-hour sampling event which began on June 3. Only two of these five quartz filter replicates were submitted to CARB for analysis, and the remaining three replicates were analyzed at NAREL. According to the analysis at CARB, elemental carbon was not present in these samples above their LOD.



Results for five more replicate filters are presented in Figure 11. These filters were loaded with a 94-hour sampling event which began on June 7. Again only two of these five quartz filter replicates were submitted to CARB for analysis, and the remaining three replicates were analyzed at NAREL. Although this sampling event was longer, rain occurred during the sampling period which is responsible for the lower concentrations of OC and EC in the air. Once again the elemental carbon was reported below the LOD for the CARB analysis.



For both sampling events, the LOD and the analytical results expressed by CARB have been converted to units of mass captured per cubic meter of air sampled. CC was not reported by CARB and therefore is not presented in the graphs. All results for the loaded quartz filters are presented in Table 7 and Table 8 at the end of this report. Two blank quartz filters were submitted to CARB for analysis, and the results for blanks are presented in Table 9 at the end of this report.

### **Elemental Analysis by XRF**

NAREL provided ten previously analyzed Teflon® filters for this study. This set of filters had previously been analyzed at three different laboratories that routinely perform XRF analysis for the STN. This sample set contained two blanks and eight loaded filters. The loaded filters contained PM<sub>2.5</sub> which was captured from a variety of locations within the STN, and the amount of PM<sub>2.5</sub> captured onto each filter varied between 300 to 3000 micrograms as determined by a separate gravimetric analysis. The filter set was shipped to CARB with a request for elemental analysis using local standard procedures. No information was given to CARB regarding the history of these samples. After CARB had completed their analysis, the filter set was analyzed again at an EPA laboratory at Research Triangle Park, North Carolina. The analysis at all five laboratories was based upon energy dispersive XRF, and reasonably good inter-laboratory agreement was expected for the sample set. The results reported for each sample were based upon the mass of analyte per square centimeter of filter area. Each laboratory calculated and reported an uncertainty with each analytical result.

### **Results of Elemental Analysis by XRF**

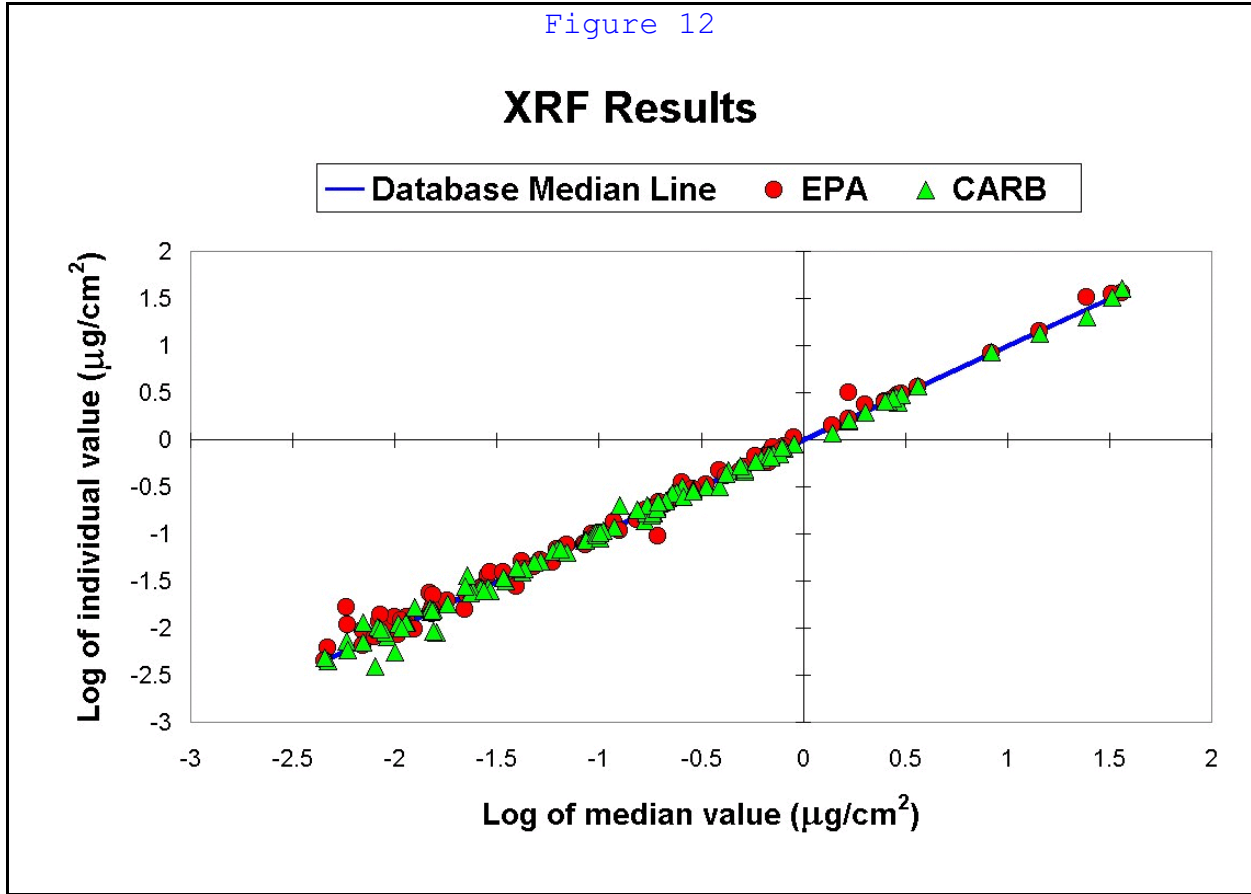
The XRF analysis generates a large amount of data. Forty-eight elements are routinely reported for STN samples by the three contract laboratories, and therefore 2400 results were anticipated for this report.

$$(48 \text{ elements/sample}) \times (10 \text{ samples}) \times (5 \text{ labs}) = 2400 \text{ results}$$

CARB reported twenty-nine elements plus one additional element, uranium. Uranium was not evaluated by this study. The EPA laboratory reported forty-one elements plus seven additional elements which are not included in this report. The EPA analysis, however, did include all of the elements reported by CARB.

The results from all five laboratories are included in Table 10 and Table 11 at the end of this report. Table 10 contains results from the eight loaded filters, and Table 11 contains results from the two blanks. Table 10 also contains a median value calculated for some of the elements. If all five laboratories reported the element present in the sample at a level above three times the uncertainty, then a median value was calculated. The CARB results and the EPA results have been compared to the median values by constructing a scatter plot shown in Figure 12. A log-log plot was constructed with the median values forming a straight line with unity slope. The corresponding results from CARB and EPA were superimposed on the median line. Some CARB values were on the median line [because the CARB value was the median result], and some values were above or below the median line. Most of the results from the CARB analysis and from the EPA analysis were very near

Figure 12



the median line. Even though Figure 12 gives a quick visual impression of many results that cover a wide range of concentrations, this scatter plot does not identify the element plotted nor the sample. Figure 13 is a three-dimensional bar graph which shows all results that were reported above  $5 \mu\text{g}/\text{cm}^2$ . All of the results in Figure 13 came from a single sample (TF02-10291) which contained an unusually high level of  $\text{PM}_{2.5}$  (approximately  $3000 \mu\text{g}$ ) captured from the ambient air. The bar graph has a linear scale over a narrow concentration range, but very few results can be shown in one graph. More results can be shown using a stacked bar graph such as those shown in Figure 14 through Figure 18.

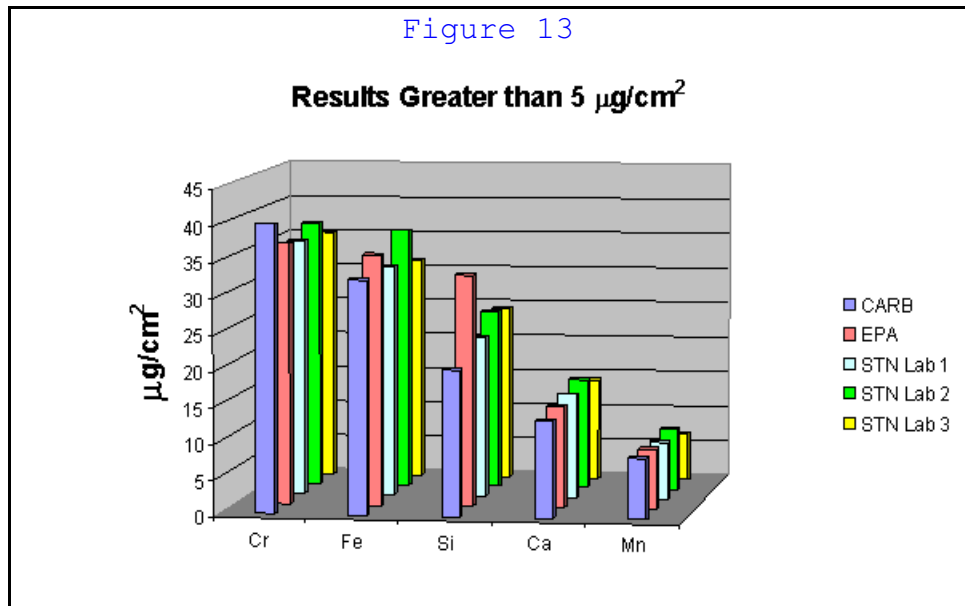
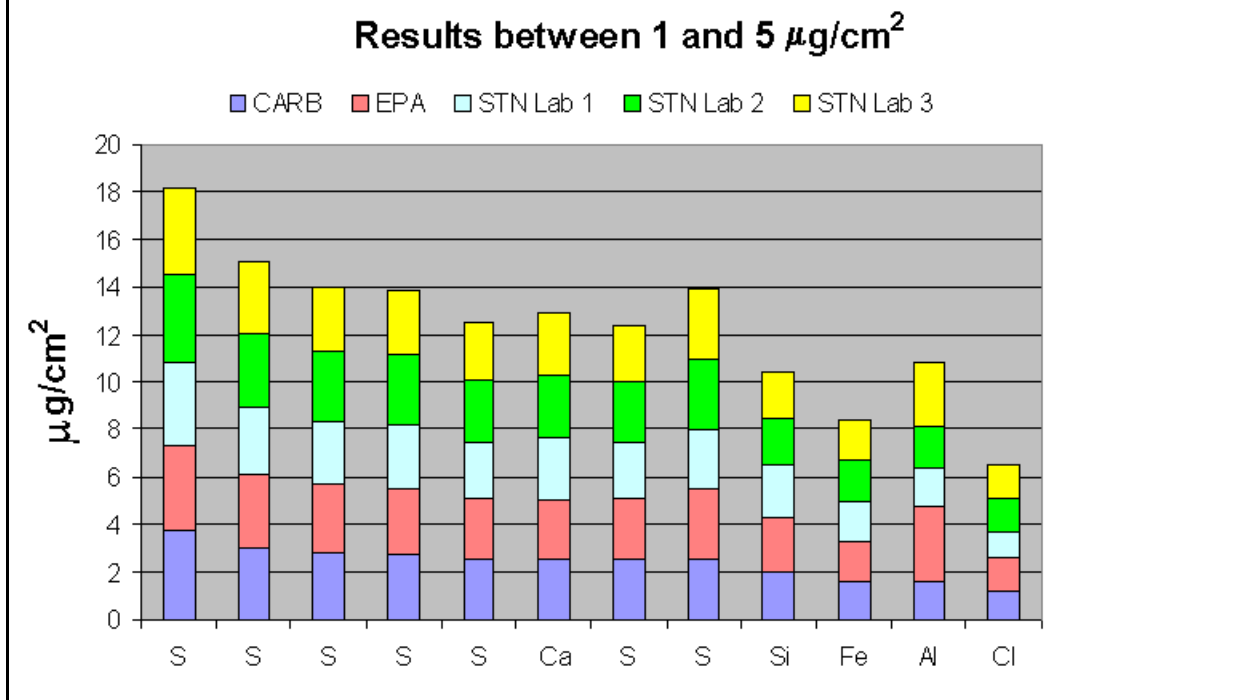


Figure 14



The results in each graph are arranged from left to right in order of decreasing concentration as determined by the CARB analysis shown in blue at the bottom of each bar. Results from all five laboratories are presented on each bar.

Figure 15

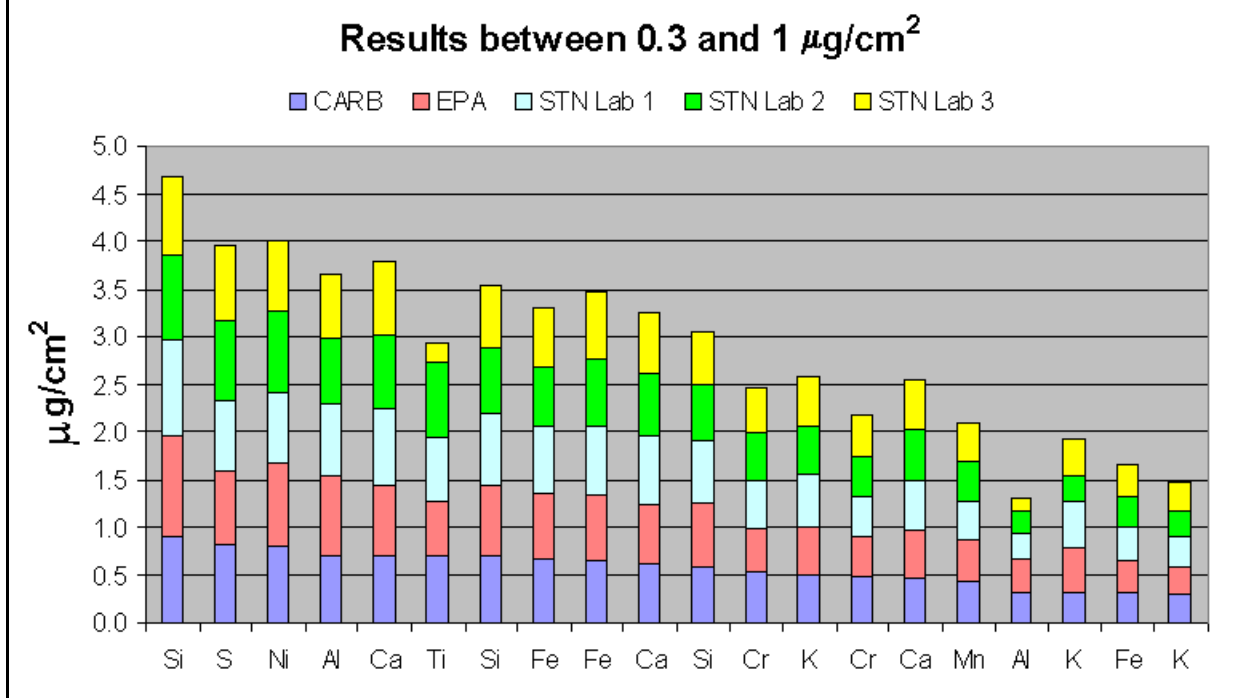
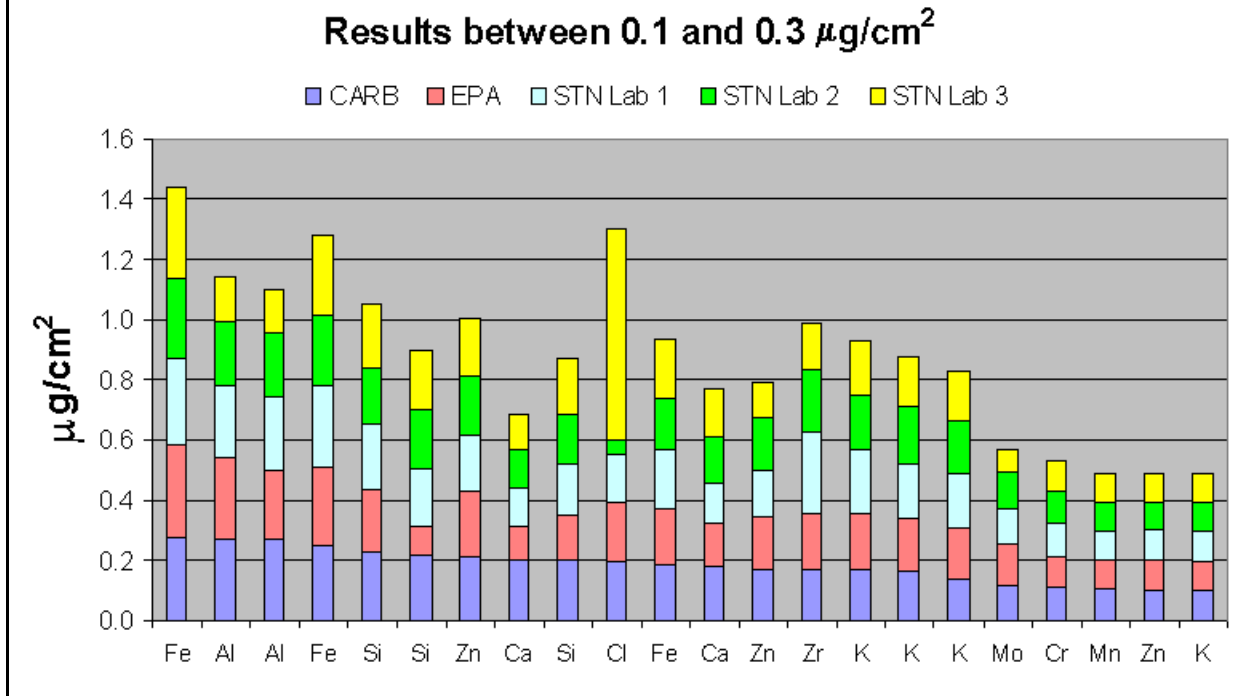


Figure 16



A significant conflict is observed in Figure 16 and also in Figure 17 for the chlorine concentration reported by STN Lab 2 and STN Lab 3. The value reported by STN Lab 3 is considerably larger than the value reported by STN Lab 2.

Figure 17

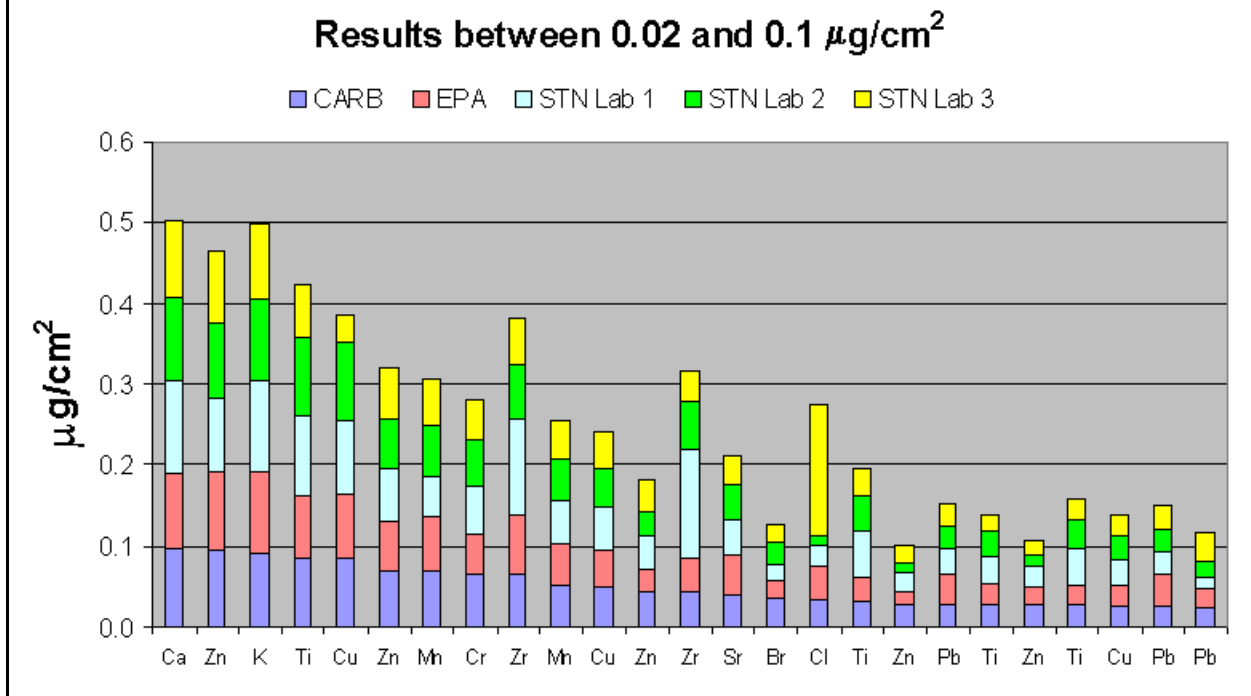


Figure 18

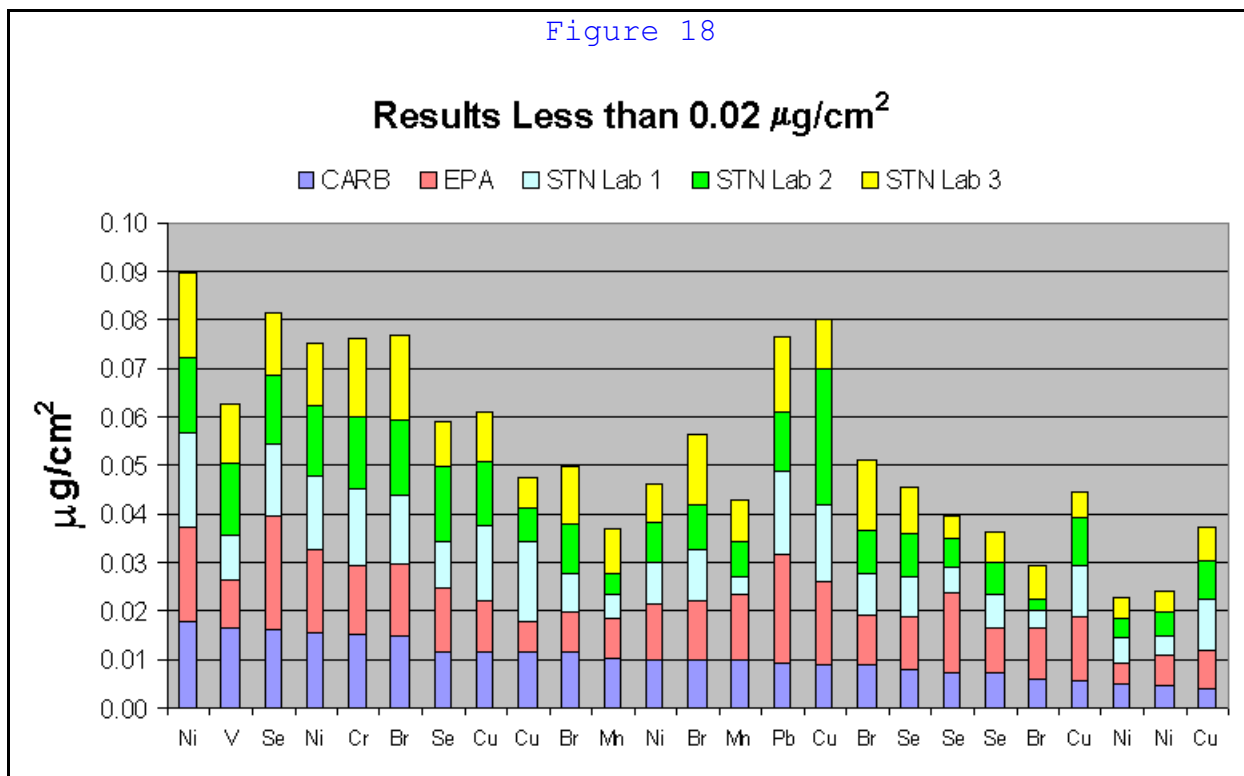


Figure 19 shows the sulfur results for all ten samples. It is clear from this graph that sulfur is present at approximately the same concentration in all samples except the two blanks. The largest conflict in sulfur concentration is observed for sample TF02-10291 which had the most massive PM<sub>2.5</sub> capture.

Figure 19

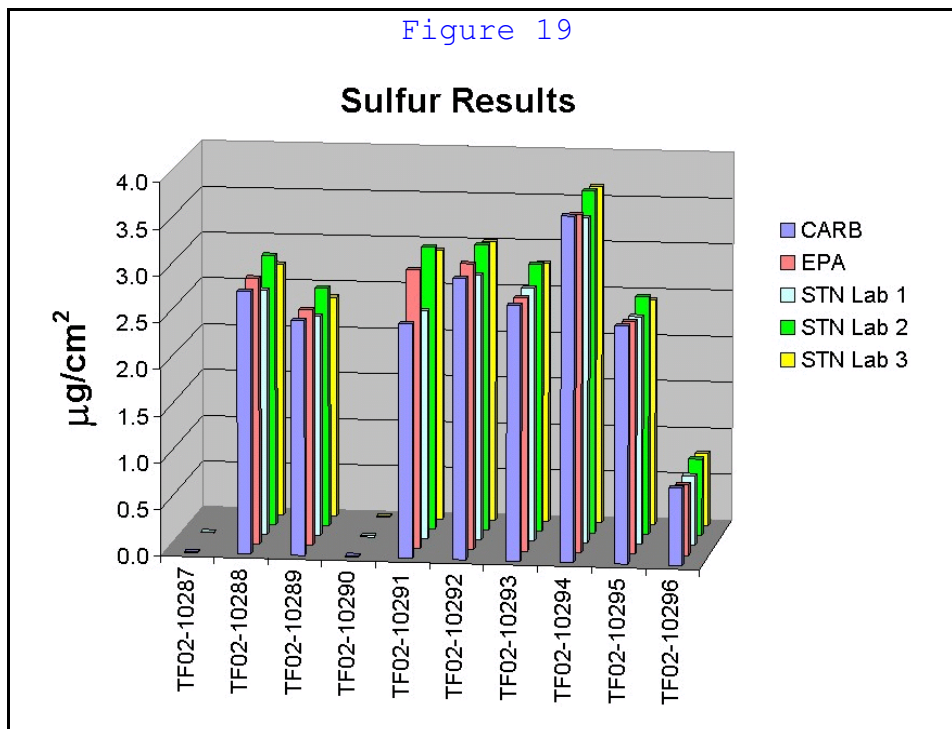
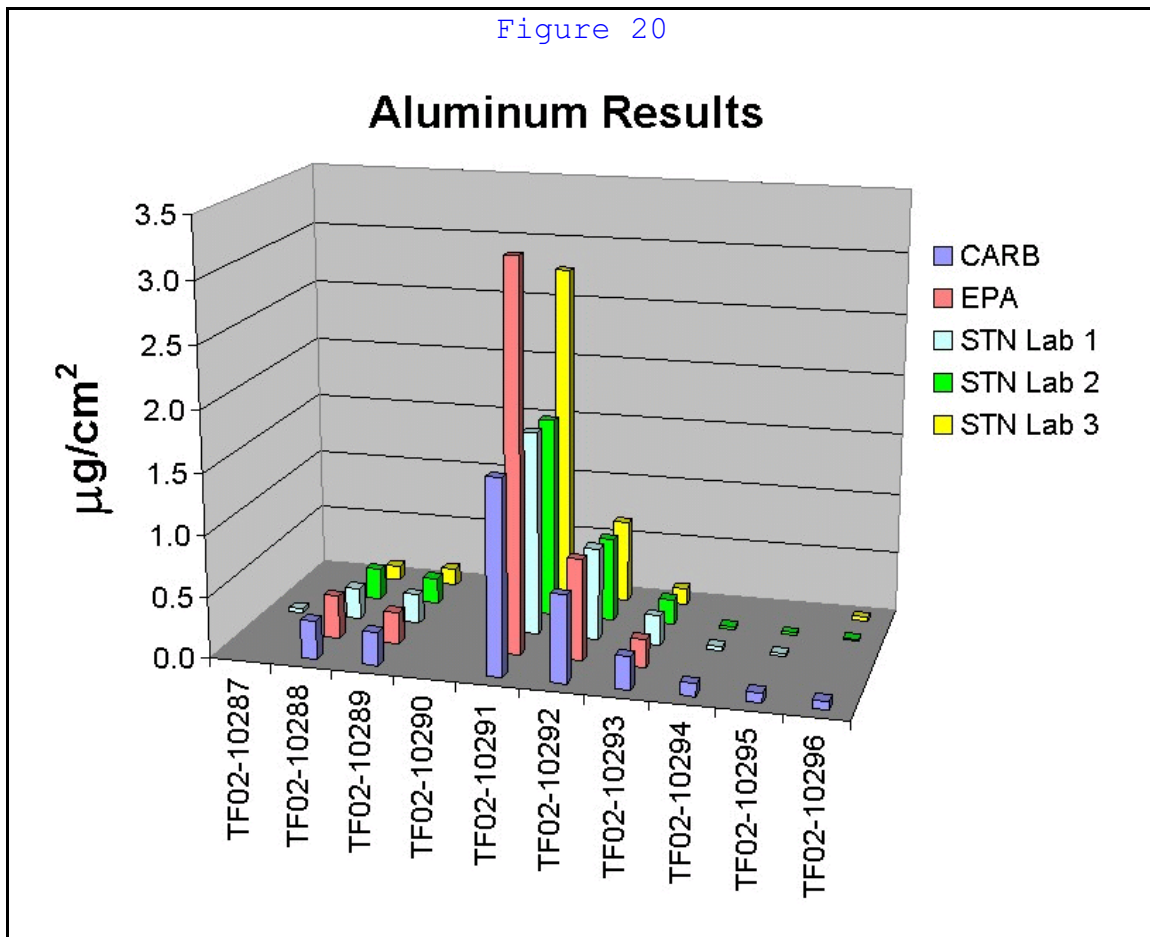


Figure 20



Aluminum was the lightest element reported by CARB. Figure 20 shows the aluminum results for all ten samples. The large conflict in aluminum concentration which is observed for sample TF02-10291 may be due to the attenuation of x-rays as they pass through the unusually thick deposit of PM<sub>2.5</sub> present on this filter. The EPA results include correction for x-ray attenuation. Correction factors are largest for light elements in thick deposits. The EPA result for aluminum in sample TF02-10291 was 30% smaller before the correction was applied. It appears that STN Lab 3 also corrected their result, but the other three laboratories did not.

Many of the elements reported for this sample set were essentially not detected. Every result in Table 10 and Table 11 includes an uncertainty expressed by the laboratory. The concentration uncertainties expressed for the EPA results are one sigma as determined by error propagation using the following sources of random error.

1. Calibration uncertainty ( $\pm 5\%$ )
2. Long term system stability ( $\pm 5\%$ )
3. Uncertainty in least squares fit
4. Uncertainty in attenuation correction
5. Uncertainty in interference correction

Other laboratories may calculate the uncertainty using a different method.

## Conclusions

Good agreement was observed for all mass measurements performed at CARB and at NAREL. Good performance was observed for the metallic weights which provided a wide range of mass measurements. All three field blanks showed PM<sub>2.5</sub> capture well below the 0.030-mg failure threshold. The largest inter-laboratory difference for captured PM<sub>2.5</sub> was 0.004 mg which is much smaller than a reasonable warning limit of 0.015 mg and significantly below a reasonable failure limit of 0.030 mg. This study indicates good performance by the gravimetric laboratory at CARB.

Excellent recoveries (94-103%) were obtained at CARB and at NAREL for the mid-level IC spikes. Good recoveries (92-111%) were also observed for the low-level spikes. Sample spike solutions identified as A-2 and C-2 were actually blank water. These blanks provided a mechanism to measure laboratory contamination from a variety of sources such as (1) the reagent water used to dilute every sample, (2) the “clean” filter extracted by the test solution which is normally provided to the field for PM<sub>2.5</sub> capture, and (3) containers used to hold and transfer the sample during the extraction and analysis process. No contamination was reported for the anion blank (A-2), but a very low level of sodium was reported for the cation blank (C-2). The sodium was reported at 0.034 µg/mL which is not significantly above the expressed [0.03 µg/mL] LOD.

Replicate Nylon® filters from two sampling events were available for this study. The longer-than-normal collection periods were necessary to provide a sample with all ions sufficiently above the detection threshold. The results reported by CARB show good agreement with the results produced at NAREL. A difference from the mean value was calculated for each analyte, and this Relative Percent Difference (RPD) is included in Table 3 and Table 4. All RPD’s were below 20 percent, and this was true even for those ions present in the sample at a low level! Blank Nylon® filters were also prepared for this study, and no significant filter contamination was reported by either laboratory. This study indicates good performance by the IC laboratory at CARB.

Good recoveries were obtained at CARB and at NAREL for the mid-level sucrose spike (102% and 98% respectively). Good recoveries (113% and 99% respectively) were also observed for the low-level sucrose spike. The spike solution identified as TOT-2 was actually blank water. This blank spike provided a mechanism to evaluate the measurement baseline at both laboratories. Both laboratories reported OC present in the blank spike solution but at a very low level near the LOD reported by CARB.

Replicate quartz filters from two sampling events were available for this study. The longer-than-normal collection periods were used again, this time to boost the amount of EC captured from the relatively clean Montgomery air. Even with the extended collection periods, however, the EC reported by CARB was still below their LOD. The OC results reported by CARB show good agreement with the results produced at NAREL. A difference from the mean value was calculated for each sample, and this Relative Percent Difference (RPD) is included in Table 7 and Table 8. All RPD’s were below 20 percent. Blank quartz filters were also prepared for this study, and CARB reported OC slightly above their LOD for one of two filters.

This study was limited in its ability to evaluate CC and EC, because none of the samples supplied for this study contained CC, and the filters supplied for this study did not contain EC at a concentration sufficiently above CARB’s LOD. Two of CARB’s thermograms were examined at NAREL because raw data provides valuable information about instrument operation, and shows the OC/EC split point. There is evidence in CARB’s thermograms that oxygen was prematurely



introduced to the sample. This observation was communicated to CARB's laboratory director, and steps are being taken by CARB to investigate possible instrument malfunction.

It is not clear why only thirty elements were reported for the XRF analysis. The laboratories contracted to perform STN analysis currently report forty-eight elements. A written SOP for the XRF analysis at CARB was not available to NAREL staff before this report was written.

The CARB laboratories participated in this PE study because they are expanding their capabilities to include STN protocols. Results from this PE study indicate overall good performance at CARB. However, some issues still need resolution: (1) why was CC not reported, (2) has the questionable performance of the carbon analyzer been resolved, and (3) why were all forty-eight XRF elements not reported?

**Table 1. Gravimetric Data**

Filter ID	Tare Mass		Final Mass		Captured PM <sub>2.5</sub>		Inter-Lab Difference* of Captured PM <sub>2.5</sub> (mg)
	CARB (mg)	NAREL (mg)	CARB (mg)	NAREL (mg)	CARB (mg)	NAREL (mg)	
T2112251	142.177	142.174	142.280	142.276	0.102	0.102	0.000
T2112252	143.095	143.093	143.197	143.198	0.102	0.105	0.003
T2112253	141.468	141.465	141.669	141.667	0.201	0.202	0.001
T2112254	140.718	140.713	140.919	140.918	0.201	0.205	0.004
T2112256	142.233	142.229	142.433	142.430	0.200	0.201	0.001
T2112257	145.289	145.287	145.403	145.399	0.114	0.112	-0.002
T2112258	143.863	143.862	143.971	143.971	0.108	0.109	0.001
T2112259	142.890	142.886	142.895	142.891	0.005	0.005	0.000
T2112260	143.370	143.366	143.374	143.369	0.004	0.003	-0.001
T2112261	141.791	141.790	141.793	141.792	0.002	0.002	0.000
M526	526.915	526.919	526.915	526.917	0.000	-0.002	-0.002
M200	200.861	200.862	200.860	200.861	-0.001	-0.001	0.000
M115	115.857	115.858	115.857	115.857	0.000	-0.001	-0.001

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

## Table 2. IC Spike Solutions

Sample ID	Analyte	Expected Result (µg/mL)	CARB Result (µg/mL)	NAREL Result (µg/mL)	CARB Recovery	NAREL Recovery	CARB LOD* (µg/mL)
A-1	Nitrate	3.500	3.278	3.503	94%	100%	0.02
A-1	Sulfate	0.200	0.184	0.203	92%	101%	0.07
A-2	Nitrate	0.000	0.000	0.000	----	----	0.02
A-2	Sulfate	0.000	0.000	0.000	----	----	0.07
A-3	Nitrate	0.150	0.144	0.174	96%	116%	0.02
A-3	Sulfate	5.500	5.496	5.583	100%	102%	0.07
C-1	Sodium	2.400	2.481	2.455	103%	102%	0.03
C-1	Ammonium	0.280	0.303	0.325	108%	116%	0.02
C-1	Potassium	0.300	0.300	0.310	100%	103%	0.05
C-2	Sodium	0.000	0.034	0.000	----	----	0.03
C-2	Ammonium	0.000	0.000	0.000	----	----	0.02
C-2	Potassium	0.000	0.000	0.000	----	----	0.05
C-3	Sodium	0.200	0.221	0.208	111%	104%	0.03
C-3	Ammonium	2.800	2.878	2.844	103%	102%	0.02
C-3	Potassium	4.500	4.515	4.564	100%	101%	0.05

\* LOD = Limit of Detection

**Table 3. Nylon Filter Replicates - May 16 Event**

Analyte	Sample ID	CARB Result (µg/mL)	NAREL Result (µg/mL)	Air Volume (m <sup>3</sup> )	Air Conc. (µg/m <sup>3</sup> )	CARB LOD* (µg/m <sup>3</sup> )	Air Conc. RPD**
Nitrate	N02-10247	0.353	-----	20.587	0.429	0.024	-9%
	N02-10248	0.333	-----	20.592	0.405	-----	-14%
	N02-10249	-----	0.411	20.553	0.500	-----	6%
	N02-10250	-----	0.393	19.423	0.506	-----	7%
	N02-10251	-----	0.399	19.160	0.520	-----	10%
Sulfate	N02-10247	-----	-----	20.587	4.170	0.085	-1%
	N02-10248	-----	-----	20.592	4.172	-----	-1%
	N02-10249	-----	2.916	20.553	4.275	-----	2%
	N02-10250	-----	2.737	19.423	4.182	-----	-1%
	N02-10251	-----	2.787	19.160	4.234	-----	1%
Sodium	N02-10247	-----	-----	20.587	0.257	0.036	3%
	N02-10248	-----	-----	20.592	0.273	-----	10%
	N02-10249	-----	0.186	20.553	0.225	-----	-10%
	N02-10250	-----	0.194	19.423	0.240	-----	-3%
	N02-10251	-----	0.206	19.160	0.248	-----	0%
Ammonium	N02-10247	-----	-----	20.587	0.759	0.024	4%
	N02-10248	-----	-----	20.592	0.709	-----	-1%
	N02-10249	-----	0.850	20.553	0.732	-----	0%
	N02-10250	-----	0.769	19.423	0.718	-----	1%
	N02-10251	-----	0.757	19.160	0.701	-----	-4%
Potassium	N02-10247	-----	-----	20.587	0.041	0.061	-12%
	N02-10248	-----	-----	20.592	0.047	-----	0%
	N02-10249	-----	0.055	20.553	0.047	-----	-1%
	N02-10250	-----	0.059	19.423	0.055	-----	9%
	N02-10251	-----	0.055	19.160	0.051	-----	5%

\* LOD = Limit of Detection

\*\* RPD = Relative Percent Difference = (result - average result)/average result

**Table 4. Nylon Filter Replicates - May 23 Event**

Analyte	Sample ID	CARB Result (µg/mL)	NAREL Result (µg/mL)	Air Volume (m <sup>3</sup> )	Air Conc. (µg/m <sup>3</sup> )	CARB LOD* (µg/m <sup>3</sup> )	Air Conc. RPD**
Nitrate	N02-10257	0.777	-----	38.526	0.504	0.013	-11%
	N02-10258	0.787	-----	38.583	0.510	-----	-9%
	N02-10259	-----	0.861	38.526	0.559	-----	-1%
	N02-10260	-----	0.903	36.290	0.622	-----	10%
	N02-10261	-----	0.899	36.175	0.622	-----	10%
Sulfate	N02-10257	6.968	-----	38.526	4.522	0.045	-1%
	N02-10258	6.990	-----	38.583	4.529	-----	0%
	N02-10259	-----	7.024	38.526	4.558	-----	0%
	N02-10260	-----	6.633	36.290	4.570	-----	0%
	N02-10261	-----	6.624	36.175	4.577	-----	1%
Sodium	N02-10257	0.329	-----	38.526	0.214	0.019	0%
	N02-10258	0.335	-----	38.583	0.217	-----	2%
	N02-10259	-----	0.303	38.526	0.197	-----	-8%
	N02-10260	-----	0.323	36.290	0.223	-----	4%
	N02-10261	-----	0.318	36.175	0.220	-----	3%
Ammonium	N02-10257	2.002	-----	38.526	1.299	0.013	0%
	N02-10258	2.014	-----	38.583	1.305	-----	0%
	N02-10259	-----	2.026	38.526	1.315	-----	1%
	N02-10260	-----	1.871	36.290	1.289	-----	-1%
	N02-10261	-----	1.864	36.175	1.288	-----	-1%
Potassium	N02-10257	0.158	-----	38.526	0.103	0.032	-6%
	N02-10258	0.162	-----	38.583	0.105	-----	-4%
	N02-10259	-----	0.177	38.526	0.115	-----	5%
	N02-10260	-----	0.169	36.290	0.116	-----	6%
	N02-10261	-----	0.158	36.175	0.109	-----	0%

\* LOD = Limit of Detection

\*\* RPD = Relative Percent Difference = (result - average result)/average result

**Table 5. Blank Nylon Filters**

<b>Analyte</b>	<b>Sample ID</b>	<b>CARB Result (µg/mL)</b>	<b>NAREL Result (µg/mL)</b>	<b>CARB LOD* (µg/mL)</b>
Nitrate	N02-10366	<LOD	-----	0.02
	N02-10367	<LOD	-----	0.02
	N02-10370	-----	0.000	-----
	N02-10371	-----	0.000	-----
Sulfate	N02-10366	<LOD	-----	0.07
	N02-10367	<LOD	-----	0.07
	N02-10370	-----	0.000	-----
	N02-10371	-----	0.000	-----
Sodium	N02-10366	<LOD	-----	0.03
	N02-10367	<LOD	-----	0.03
	N02-10370	-----	0.000	-----
	N02-10371	-----	0.000	-----
Ammonium	N02-10366	<LOD	-----	0.02
	N02-10367	<LOD	-----	0.02
	N02-10370	-----	0.000	-----
	N02-10371	-----	0.000	-----
Potassium	N02-10366	<LOD	-----	0.05
	N02-10367	<LOD	-----	0.05
	N02-10370	-----	0.000	-----
	N02-10371	-----	0.000	-----

\* LOD = Limit of Detection

**Table 6. Carbon (Sucrose) Spike Solutions**

<b>Sample ID</b>	<b>Analyte</b>	<b>Expected Result (µg spiked)</b>	<b>CARB Result (µg spiked)</b>	<b>NAREL Result (µg spiked)</b>	<b>CARB Recovery</b>	<b>NAREL Recovery</b>	<b>CARB LOD* (µg spiked)</b>
TOT-1	CC	0.00	not analyzed	0.00	-----	-----	-----
TOT-1	EC	0.00	<LOD	0.00	-----	-----	0.4
TOT-1	OC	32.00	32.60	31.49	102%	98%	0.4
TOT-1	TC	32.00	32.60	31.49	102%	98%	0.4
TOT-2	CC	0.00	not analyzed	0.00	-----	-----	-----
TOT-2	EC	0.00	<LOD	0.00	-----	-----	0.4
TOT-2	OC	0.00	0.44	0.34	-----	-----	0.4
TOT-2	TC	0.00	0.44	0.34	-----	-----	0.4
TOT-3	CC	0.00	not analyzed	0.00	-----	-----	-----
TOT-3	EC	0.00	<LOD	0.05	-----	-----	0.4
TOT-3	OC	4.00	4.52	3.97	113%	99%	0.4
TOT-3	TC	4.00	4.52	3.97	113%	99%	0.4

\* LOD = Limit of Detection

**Table 7. Quartz Filter Replicates - June 3 Event**

Analyte	Sample ID	CARB Result (µg/cm <sup>2</sup> )	NAREL Result (µg/cm <sup>2</sup> )	Air Volume (m <sup>3</sup> )	Air Conc. (µg/m <sup>3</sup> )	CARB LOD* (µg/m <sup>3</sup> )	Air Conc. RPD**
CC	Q02-10303	not analyzed	-----	19.37	-----	-----	-----
	Q02-10304	not analyzed	-----	19.36	-----	-----	-----
	Q02-10305	-----	0.00	19.36	0.00	-----	-----
	Q02-10306	-----	0.00	19.72	0.00	-----	-----
	Q02-10307	-----	0.00	19.72	0.00	-----	-----
EC	Q02-10303	<0.8	-----	19.37	<0.49	0.49	-----
	Q02-10304	<0.8	-----	19.36	<0.49	0.49	-----
	Q02-10305	-----	0.73	19.36	0.44	-----	11%
	Q02-10306	-----	0.71	19.72	0.43	-----	7%
	Q02-10307	-----	0.55	19.72	0.33	-----	-18%
OC	Q02-10303	12.03	-----	19.37	7.30	0.49	9%
	Q02-10304	12.39	-----	19.36	7.53	0.49	12%
	Q02-10305	-----	10.44	19.36	6.34	-----	-6%
	Q02-10306	-----	10.48	19.72	6.25	-----	-7%
	Q02-10307	-----	10.40	19.72	6.20	-----	-8%
TC	Q02-10303	12.03	-----	19.37	7.30	0.49	5%
	Q02-10304	12.39	-----	19.36	7.53	0.49	8%
	Q02-10305	-----	11.17	19.36	6.78	-----	-3%
	Q02-10306	-----	11.20	19.72	6.68	-----	-4%
	Q02-10307	-----	10.95	19.72	6.53	-----	-6%

\* LOD = Limit of Detection

\*\* RPD = Relative Percent Difference = (result - average result)/average result



**Table 8. Quartz Filter Replicates - June 7 Event**

Analyte	Sample ID	CARB Result (µg/cm <sup>2</sup> )	NAREL Result (µg/cm <sup>2</sup> )	Air Volume (m <sup>3</sup> )	Air Conc. (µg/m <sup>3</sup> )	CARB LOD* (µg/m <sup>3</sup> )	Air Conc. RPD**
CC	Q02-10313	not analyzed	----	37.90	----	----	----
	Q02-10314	not analyzed	----	37.96	----	----	----
	Q02-10315	----	0.00	37.84	0.00	----	----
	Q02-10316	----	0.00	38.63	0.00	----	----
	Q02-10317	----	0.00	38.58	0.00	----	----
EC	Q02-10313	<0.8	----	37.90	<0.25	0.25	----
	Q02-10314	<0.8	----	37.96	<0.25	0.25	----
	Q02-10315	----	0.84	37.84	0.26	----	2%
	Q02-10316	----	0.89	38.63	0.27	----	6%
	Q02-10317	----	0.77	38.58	0.24	----	-8%
OC	Q02-10313	12.46	----	37.90	3.87	0.25	8%
	Q02-10314	13.09	----	37.96	4.06	0.25	13%
	Q02-10315	----	10.66	37.84	3.31	----	-8%
	Q02-10316	----	10.75	38.63	3.27	----	-9%
	Q02-10317	----	11.21	38.58	3.42	----	-5%
TC	Q02-10313	12.46	----	37.90	3.87	0.25	3%
	Q02-10314	13.09	----	37.96	4.06	0.25	8%
	Q02-10315	----	11.50	37.84	3.57	----	-4%
	Q02-10316	----	11.64	38.63	3.54	----	-5%
	Q02-10317	----	11.99	38.58	3.65	----	-2%

\* LOD = Limit of Detection

\*\* RPD = Relative Percent Difference = (result - average result)/average result

**Table 9. Blank Quartz Filters**

Analyte	Sample ID	CARB Result ( $\mu\text{g}/\text{cm}^2$ )	NAREL Result ( $\mu\text{g}/\text{cm}^2$ )	CARB LOD* ( $\mu\text{g}/\text{cm}^2$ )
CC	Q02-10372	not analyzed	----	----
	Q02-10373	not analyzed	----	----
	Q02-10376	----	0.00	----
	Q02-10377	----	0.00	----
EC	Q02-10372	<0.8	----	0.80
	Q02-10373	<0.8	----	0.80
	Q02-10376	----	0.00	----
	Q02-10377	----	0.00	----
OC	Q02-10372	<0.8	----	0.80
	Q02-10373	1.17	----	0.80
	Q02-10376	----	0.09	----
	Q02-10377	----	0.07	----
TC	Q02-10372	<0.8	----	0.80
	Q02-10373	1.17	----	0.80
	Q02-10376	----	0.09	----
	Q02-10377	----	0.07	----

\* LOD = Limit of Detection

**Table 10. XRF Data - Loaded Filters**

Sample ID	Z	Element	CARB ( $\mu\text{g}/\text{cm}^2$ )	EPA ( $\mu\text{g}/\text{cm}^2$ )	STN Lab 1 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab2 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab3 ( $\mu\text{g}/\text{cm}^2$ )	Median* ( $\mu\text{g}/\text{cm}^2$ )
TF02-10288	11	Na	not reported	$0.0251 \pm 0.0204$	$0.0586 \pm 0.0228$	$0 \pm 0.0087$	$0 \pm 0.0774$	-----
TF02-10288	12	Mg	not reported	$0.1453 \pm 0.0206$	$0.0629 \pm 0.0075$	$0.0391 \pm 0.0028$	$0 \pm 0.0246$	-----
TF02-10288	13	Al	$0.3202 \pm 0.0953$	$0.3526 \pm 0.0449$	$0.2528 \pm 0.0072$	$0.2561 \pm 0.0019$	$0.1249 \pm 0.0205$	0.2561
TF02-10288	14	Si	$0.9026 \pm 0.2857$	$1.0561 \pm 0.0888$	$1.0025 \pm 0.0163$	$0.9023 \pm 0.0048$	$0.7951 \pm 0.0913$	0.9026
TF02-10288	15	P	< 0.0017	$-0.0686 \pm 0.0322$	$0.1000 \pm 0.0038$	$0.0698 \pm 0.0033$	$0 \pm 0.0055$	-----
TF02-10288	16	S	$2.8255 \pm 0.1415$	$2.8684 \pm 0.2109$	$2.6448 \pm 0.0150$	$2.9210 \pm 0.0085$	$2.7327 \pm 0.3096$	2.8255
TF02-10288	17	Cl	$0.0373 \pm 0.0126$	$0.0739 \pm 0.0102$	$0.0372 \pm 0.0035$	$0.0081 \pm 0.0005$	$0.2572 \pm 0.0299$	-----
TF02-10288	19	K	$0.1390 \pm 0.0281$	$0.1657 \pm 0.0095$	$0.1823 \pm 0.0082$	$0.1762 \pm 0.0010$	$0.1663 \pm 0.0190$	0.1663
TF02-10288	20	Ca	$0.4577 \pm 0.0774$	$0.5118 \pm 0.0268$	$0.5223 \pm 0.0099$	$0.5324 \pm 0.0019$	$0.5135 \pm 0.0580$	0.5135
TF02-10288	21	Sc	not reported	$0.0040 \pm 0.0022$	$0 \pm 0.0000$	$0 \pm 0.0005$	$0 \pm 0.0039$	-----
TF02-10288	22	Ti	$0.0266 \pm 0.0063$	$0.0266 \pm 0.0042$	$0.0339 \pm 0.0025$	$0.0311 \pm 0.0003$	$0.0199 \pm 0.0016$	0.0266
TF02-10288	23	V	$0.0059 \pm 0.0017$	$0.0018 \pm 0.0014$	$0.0017 \pm 0.0015$	$0.0040 \pm 0.0002$	$0 \pm 0.0007$	-----
TF02-10288	24	Cr	$0.4706 \pm 0.0237$	$0.4206 \pm 0.0220$	$0.4186 \pm 0.0047$	$0.4277 \pm 0.0020$	$0.4441 \pm 0.0225$	0.4277
TF02-10288	25	Mn	$0.0681 \pm 0.0039$	$0.0690 \pm 0.0069$	$0.0484 \pm 0.0022$	$0.0621 \pm 0.0003$	$0.0590 \pm 0.0057$	0.0621
TF02-10288	26	Fe	$0.6675 \pm 0.0335$	$0.6858 \pm 0.0498$	$0.6975 \pm 0.0049$	$0.6304 \pm 0.0028$	$0.6233 \pm 0.0314$	0.6675
TF02-10288	27	Co	< 0.0050	$-0.0042 \pm 0.0023$	$0 \pm 0.0000$	$0 \pm 0.0018$	$0 \pm 0.0037$	-----
TF02-10288	28	Ni	$0.0099 \pm 0.0007$	$0.0116 \pm 0.0019$	$0.0084 \pm 0.0006$	$0.0082 \pm 0.0002$	$0.0082 \pm 0.0008$	0.0084
TF02-10288	29	Cu	$0.0090 \pm 0.0008$	$0.0170 \pm 0.0022$	$0.0159 \pm 0.0009$	$0.0280 \pm 0.0002$	$0.0100 \pm 0.0009$	0.0159
TF02-10288	30	Zn	$0.0944 \pm 0.0048$	$0.0990 \pm 0.0089$	$0.0906 \pm 0.0015$	$0.0920 \pm 0.0008$	$0.0888 \pm 0.0046$	0.0920
TF02-10288	31	Ga	not reported	$-0.0070 \pm 0.0028$	$0 \pm 0.0000$	$0 \pm 0.0003$	$0.0034 \pm 0.0013$	-----
TF02-10288	33	As	$0.0036 \pm 0.0051$	$-0.0038 \pm 0.0037$	$0.0015 \pm 0.0008$	$0.0034 \pm 0.0005$	$0.0016 \pm 0.0024$	-----
TF02-10288	34	Se	$0.0164 \pm 0.0012$	$0.0233 \pm 0.0031$	$0.0148 \pm 0.0008$	$0.0143 \pm 0.0006$	$0.0128 \pm 0.0013$	0.0148
TF02-10288	35	Br	$0.0113 \pm 0.0009$	$0.0085 \pm 0.0025$	$0.0077 \pm 0.0006$	$0.0104 \pm 0.0005$	$0.0118 \pm 0.0012$	0.0104
TF02-10288	37	Rb	$0.0018 \pm 0.0022$	$0.0073 \pm 0.0022$	$0 \pm 0.0000$	$0.0020 \pm 0.0004$	$0 \pm 0.0009$	-----
TF02-10288	38	Sr	$0.0038 \pm 0.0008$	$0.0014 \pm 0.0057$	$0.0050 \pm 0.0006$	$0.0011 \pm 0.0003$	$0.0018 \pm 0.0011$	-----
TF02-10288	39	Y	$0.0052 \pm 0.0009$	$0.0016 \pm 0.0059$	$0 \pm 0.0000$	$0 \pm 0.0003$	$0 \pm 0.0012$	-----
TF02-10288	40	Zr	$0.1681 \pm 0.0085$	$0.1851 \pm 0.0179$	$0.2760 \pm 0.0033$	$0.2039 \pm 0.0010$	$0.1551 \pm 0.0080$	0.1851
TF02-10288	41	Nb	not reported	$0.0066 \pm 0.0061$	$0.0005 \pm 0.0011$	$0 \pm 0.0004$	$0 \pm 0.0017$	-----
TF02-10288	42	Mo	$0.0060 \pm 0.0020$	$0.0027 \pm 0.0062$	$0.0074 \pm 0.0033$	$0.0035 \pm 0.0005$	$0 \pm 0.0022$	-----

Sample ID	Z	Element	CARB ( $\mu\text{g}/\text{cm}^2$ )	EPA ( $\mu\text{g}/\text{cm}^2$ )	STN Lab 1 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab2 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab3 ( $\mu\text{g}/\text{cm}^2$ )	Median* ( $\mu\text{g}/\text{cm}^2$ )
TF02-10288	47	Ag	not reported	$-0.0010 \pm 0.0220$	$0.0020 \pm 0.0026$	$0.0061 \pm 0.0008$	$0 \pm 0.0038$	-----
TF02-10288	48	Cd	not reported	$0.0003 \pm 0.0078$	$0.0089 \pm 0.0031$	$0.0031 \pm 0.0010$	$0.0053 \pm 0.0039$	-----
TF02-10288	49	In	not reported	not reported	$0 \pm 0.0000$	$0.0041 \pm 0.0011$	$0.0033 \pm 0.0042$	-----
TF02-10288	50	Sn	$0.0230 \pm 0.0041$	$0.0037 \pm 0.0060$	$0 \pm 0.0000$	$0.0226 \pm 0.0013$	$0.0263 \pm 0.0072$	-----
TF02-10288	51	Sb	$0.0101 \pm 0.0139$	$0.0302 \pm 0.0088$	$0.0003 \pm 0.0082$	$0.0036 \pm 0.0019$	$0 \pm 0.0056$	-----
TF02-10288	55	Cs	not reported	$0.0124 \pm 0.0045$	$0 \pm 0.0000$	$0 \pm 0.0000$	$0.0070 \pm 0.0144$	-----
TF02-10288	56	Ba	$0.0080 \pm 0.0438$	$-0.0066 \pm 0.0083$	$0 \pm 0.0000$	$0.0274 \pm 0.0018$	$0.0164 \pm 0.0202$	-----
TF02-10288	57	La	not reported	$-0.0033 \pm 0.0057$	$0 \pm 0.0000$	$0.0030 \pm 0.0008$	$0.0105 \pm 0.0273$	-----
TF02-10288	58	Ce	not reported	$0.0029 \pm 0.0043$	$0 \pm 0.0000$	$0 \pm 0.0009$	$0.0093 \pm 0.0336$	-----
TF02-10288	62	Sm	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0007$	$0 \pm 0.0082$	-----
TF02-10288	63	Eu	not reported	not reported	$0.0374 \pm 0.0048$	$0 \pm 0.0012$	$0.0064 \pm 0.0260$	-----
TF02-10288	65	Tb	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0022$	$0.0008 \pm 0.0239$	-----
TF02-10288	72	Hf	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0116$	-----
TF02-10288	73	Ta	not reported	not reported	$0.0006 \pm 0.0009$	$0 \pm 0.0008$	$0.0211 \pm 0.0084$	-----
TF02-10288	74	W	not reported	$-0.0041 \pm 0.0072$	$0.0038 \pm 0.0026$	$0 \pm 0.0012$	$0 \pm 0.0074$	-----
TF02-10288	77	Ir	not reported	not reported	$0.0004 \pm 0.0000$	$0 \pm 0.0001$	$0.0047 \pm 0.0026$	-----
TF02-10288	79	Au	not reported	$-0.0023 \pm 0.0044$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0025$	-----
TF02-10288	80	Hg	$< 0.0032$	$0.0030 \pm 0.0045$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0019$	-----
TF02-10288	82	Pb	$0.0269 \pm 0.0027$	$0.0366 \pm 0.0074$	$0.0341 \pm 0.0018$	$0.0270 \pm 0.0003$	$0.0284 \pm 0.0031$	0.0284
TF02-10289	11	Na	not reported	$0.0383 \pm 0.0162$	$0.0728 \pm 0.0205$	$0 \pm 0.0085$	$0 \pm 0.0646$	-----
TF02-10289	12	Mg	not reported	$0.0584 \pm 0.0143$	$0.0347 \pm 0.0067$	$0.0426 \pm 0.0013$	$0 \pm 0.0217$	-----
TF02-10289	13	Al	$0.2740 \pm 0.0815$	$0.2638 \pm 0.0373$	$0.2405 \pm 0.0067$	$0.2187 \pm 0.0011$	$0.1433 \pm 0.0211$	0.2405
TF02-10289	14	Si	$0.6931 \pm 0.2194$	$0.7385 \pm 0.0650$	$0.7571 \pm 0.0143$	$0.6811 \pm 0.0043$	$0.6524 \pm 0.0746$	0.6931
TF02-10289	15	P	$0.0158 \pm 0.0216$	$0.0394 \pm 0.0209$	$0.0426 \pm 0.0033$	$0.0208 \pm 0.0031$	$0 \pm 0.0048$	-----
TF02-10289	16	S	$2.5213 \pm 0.1263$	$2.5436 \pm 0.1866$	$2.3777 \pm 0.0142$	$2.5801 \pm 0.0121$	$2.3841 \pm 0.2692$	2.5213
TF02-10289	17	Cl	$0.0374 \pm 0.0124$	$0.0700 \pm 0.0097$	$0.0254 \pm 0.0031$	$0 \pm 0.0005$	$0.0128 \pm 0.0051$	-----
TF02-10289	19	K	$0.1597 \pm 0.0321$	$0.1791 \pm 0.0101$	$0.1860 \pm 0.0081$	$0.1888 \pm 0.0012$	$0.1648 \pm 0.0188$	0.1791
TF02-10289	20	Ca	$0.6148 \pm 0.1037$	$0.6076 \pm 0.0317$	$0.7449 \pm 0.0116$	$0.6503 \pm 0.0028$	$0.6197 \pm 0.0698$	0.6197
TF02-10289	21	Sc	not reported	$-0.0013 \pm 0.0022$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0047$	-----
TF02-10289	22	Ti	$0.0263 \pm 0.0060$	$0.0259 \pm 0.0039$	$0.0454 \pm 0.0025$	$0.0341 \pm 0.0004$	$0.0258 \pm 0.0017$	0.0263
TF02-10289	23	V	$0.0031 \pm 0.0045$	$0.0022 \pm 0.0013$	$0 \pm 0.0000$	$0.0030 \pm 0.0002$	$0 \pm 0.0007$	-----

Sample ID	Z	Element	CARB ( $\mu\text{g}/\text{cm}^2$ )	EPA ( $\mu\text{g}/\text{cm}^2$ )	STN Lab 1 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab2 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab3 ( $\mu\text{g}/\text{cm}^2$ )	Median* ( $\mu\text{g}/\text{cm}^2$ )
TF02-10289	24	Cr	0.0644 ± 0.0035	0.0500 ± 0.0032	0.0591 ± 0.0019	0.0591 ± 0.0004	0.0480 ± 0.0026	0.0591
TF02-10289	25	Mn	0.0516 ± 0.0028	0.0526 ± 0.0052	0.0518 ± 0.0016	0.0501 ± 0.0007	0.0486 ± 0.0029	0.0516
TF02-10289	26	Fe	0.3161 ± 0.0159	0.3343 ± 0.0248	0.3443 ± 0.0034	0.3198 ± 0.0054	0.3323 ± 0.0168	0.3323
TF02-10289	27	Co	< 0.0050	0 ± 0.0021	0.0007 ± 0.0009	0 ± 0.0004	0 ± 0.0020	-----
TF02-10289	28	Ni	0.0018 ± 0.0004	0.0040 ± 0.0014	0.0017 ± 0.0005	0.0021 ± 0.0002	0.0011 ± 0.0005	-----
TF02-10289	29	Cu	0.0495 ± 0.0026	0.0453 ± 0.0036	0.0540 ± 0.0012	0.0480 ± 0.0003	0.0461 ± 0.0025	0.0480
TF02-10289	30	Zn	0.0265 ± 0.0015	0.0238 ± 0.0038	0.0252 ± 0.0010	0.0130 ± 0.0003	0.0191 ± 0.0012	0.0238
TF02-10289	31	Ga	not reported	-0.0030 ± 0.0026	0 ± 0.0000	0 ± 0.0001	0 ± 0.0012	-----
TF02-10289	33	As	< 0.0018	0.0004 ± 0.0029	0 ± 0.0000	0 ± 0.0002	0.0022 ± 0.0017	-----
TF02-10289	34	Se	0.0115 ± 0.0010	0.0132 ± 0.0024	0.0095 ± 0.0007	0.0154 ± 0.0002	0.0094 ± 0.0010	0.0115
TF02-10289	35	Br	0.0090 ± 0.0008	0.0052 ± 0.0023	0.0117 ± 0.0006	0.0143 ± 0.0002	0.0140 ± 0.0012	-----
TF02-10289	37	Rb	0.0003 ± 0.0019	0.0059 ± 0.0021	0.0015 ± 0.0004	0 ± 0.0001	0 ± 0.0008	-----
TF02-10289	38	Sr	0.0038 ± 0.0007	-0.0057 ± 0.0051	0.0036 ± 0.0005	0 ± 0.0002	0.0008 ± 0.0010	-----
TF02-10289	39	Y	< 0.0016	-0.0023 ± 0.0057	0 ± 0.0000	0 ± 0.0002	0 ± 0.0012	-----
TF02-10289	40	Zr	0.0129 ± 0.0011	-0.0012 ± 0.0050	0.0277 ± 0.0015	0.0067 ± 0.0002	0.0110 ± 0.0015	-----
TF02-10289	41	Nb	not reported	0.0087 ± 0.0060	0.0029 ± 0.0010	0 ± 0.0003	0 ± 0.0015	-----
TF02-10289	42	Mo	0.0046 ± 0.0014	-0.0013 ± 0.0054	0.0036 ± 0.0026	0 ± 0.0003	0 ± 0.0018	-----
TF02-10289	47	Ag	not reported	0.0132 ± 0.0233	0 ± 0.0000	0 ± 0.0007	0.0014 ± 0.0037	-----
TF02-10289	48	Cd	not reported	-0.0066 ± 0.0073	0.0182 ± 0.0031	0.0086 ± 0.0008	0 ± 0.0037	-----
TF02-10289	49	In	not reported	not reported	0.0229 ± 0.0040	0 ± 0.0009	0 ± 0.0039	-----
TF02-10289	50	Sn	0.0109 ± 0.0110	0.0067 ± 0.0058	0 ± 0.0000	0 ± 0.0011	0.0208 ± 0.0069	-----
TF02-10289	51	Sb	< 0.0091	0.0173 ± 0.0088	0 ± 0.0000	0.0176 ± 0.0019	0 ± 0.0053	-----
TF02-10289	55	Cs	not reported	-0.0003 ± 0.0039	0 ± 0.0000	0 ± 0.0010	0 ± 0.0137	-----
TF02-10289	56	Ba	< 0.0290	0.0056 ± 0.0072	0 ± 0.0000	0.0291 ± 0.0018	0.0353 ± 0.0191	-----
TF02-10289	57	La	not reported	0.0007 ± 0.0047	0 ± 0.0000	0.0030 ± 0.0010	0 ± 0.0251	-----
TF02-10289	58	Ce	not reported	0.0015 ± 0.0038	0 ± 0.0000	0.0130 ± 0.0013	0 ± 0.0313	-----
TF02-10289	62	Sm	not reported	not reported	0.0048 ± 0.0025	0 ± 0.0005	0 ± 0.0027	-----
TF02-10289	63	Eu	not reported	not reported	0 ± 0.0000	0 ± 0.0007	0 ± 0.0166	-----
TF02-10289	65	Tb	not reported	not reported	0 ± 0.0000	0 ± 0.0009	0.0018 ± 0.0131	-----
TF02-10289	72	Hf	not reported	not reported	0 ± 0.0000	0 ± 0.0002	0 ± 0.0108	-----
TF02-10289	73	Ta	not reported	not reported	0.0106 ± 0.0013	0 ± 0.0006	0 ± 0.0076	-----

Sample ID	Z	Element	CARB ( $\mu\text{g}/\text{cm}^2$ )	EPA ( $\mu\text{g}/\text{cm}^2$ )	STN Lab 1 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab2 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab3 ( $\mu\text{g}/\text{cm}^2$ )	Median* ( $\mu\text{g}/\text{cm}^2$ )
TF02-10289	74	W	not reported	$-0.0168 \pm 0.0053$	$0.0172 \pm 0.0020$	$0 \pm 0.0009$	$0 \pm 0.0055$	-----
TF02-10289	77	Ir	not reported	not reported	$0.0002 \pm 0.0000$	$0 \pm 0.0001$	$0 \pm 0.0023$	-----
TF02-10289	79	Au	not reported	$-0.0018 \pm 0.0036$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0.0012 \pm 0.0020$	-----
TF02-10289	80	Hg	$< 0.0032$	$0.0058 \pm 0.0041$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0.0030 \pm 0.0017$	-----
TF02-10289	82	Pb	$0.0115 \pm 0.0022$	$0.0076 \pm 0.0056$	$0.0106 \pm 0.0012$	$0.0102 \pm 0.0003$	$0.0117 \pm 0.0023$	-----
TF02-10291	11	Na	not reported	$0.3766 \pm 0.1247$	$0.9146 \pm 0.0319$	$0 \pm 0.0088$	$0 \pm 0.2103$	-----
TF02-10291	12	Mg	not reported	$1.9965 \pm 0.3978$	$1.4575 \pm 0.0136$	$1.3204 \pm 0.0133$	$0.6853 \pm 0.1343$	-----
TF02-10291	13	Al	$1.5860 \pm 0.4707$	$3.1735 \pm 0.3852$	$1.6701 \pm 0.0114$	$1.6431 \pm 0.0101$	$2.7717 \pm 0.3280$	1.6701
TF02-10291	14	Si	$20.1428 \pm 6.3705$	$32.2484 \pm 3.1158$	$22.4050 \pm 0.0700$	$25.0176 \pm 0.0922$	$24.3982 \pm 3.2513$	24.3982
TF02-10291	15	P	$0.3375 \pm 0.1410$	$0.5183 \pm 0.0796$	$1.1725 \pm 0.0061$	$0.5582 \pm 0.0163$	$0.2047 \pm 0.0291$	-----
TF02-10291	16	S	$2.5157 \pm 0.1262$	$2.9964 \pm 0.2509$	$2.4568 \pm 0.0168$	$3.0497 \pm 0.0123$	$2.9257 \pm 0.3691$	2.9257
TF02-10291	17	Cl	$1.1862 \pm 0.3441$	$1.4093 \pm 0.1111$	$1.0729 \pm 0.0107$	$1.4254 \pm 0.0113$	$1.3912 \pm 0.1714$	1.3912
TF02-10291	19	K	$0.3196 \pm 0.0648$	$0.4697 \pm 0.0273$	$0.4762 \pm 0.0193$	$0.2821 \pm 0.0045$	$0.3857 \pm 0.0464$	0.3857
TF02-10291	20	Ca	$13.3984 \pm 2.2524$	$14.1018 \pm 0.7379$	$14.5820 \pm 0.0522$	$15.4662 \pm 0.0567$	$14.3009 \pm 1.6894$	14.3009
TF02-10291	21	Sc	not reported	$0.0046 \pm 0.0081$	$0.1997 \pm 0.0056$	$0 \pm 0.0129$	$0 \pm 0.0972$	-----
TF02-10291	22	Ti	$0.6942 \pm 0.0365$	$0.5736 \pm 0.0454$	$0.6760 \pm 0.0117$	$0.7970 \pm 0.0038$	$0.1914 \pm 0.0108$	0.6760
TF02-10291	23	V	$0.1444 \pm 0.0279$	$0.0761 \pm 0.0090$	$0.2253 \pm 0.0071$	$0.1247 \pm 0.0072$	$0 \pm 0.0035$	-----
TF02-10291	24	Cr	$40.0560 \pm 2.0029$	$36.4046 \pm 1.8596$	$35.8700 \pm 0.0437$	$37.3965 \pm 0.1330$	$35.1416 \pm 1.7584$	36.4046
TF02-10291	25	Mn	$8.4389 \pm 0.4326$	$8.3340 \pm 0.5963$	$7.9222 \pm 0.0219$	$8.5239 \pm 0.0364$	$6.6018 \pm 0.4868$	8.3340
TF02-10291	26	Fe	$32.4125 \pm 1.6208$	$34.9682 \pm 2.4945$	$32.3390 \pm 0.0338$	$36.5152 \pm 0.1456$	$31.3363 \pm 1.5681$	32.4125
TF02-10291	27	Co	$0.1695 \pm 0.2321$	$0.0983 \pm 0.0137$	$0.0698 \pm 0.0077$	$0 \pm 0.0170$	$0 \pm 0.1789$	-----
TF02-10291	28	Ni	$0.8061 \pm 0.0404$	$0.8594 \pm 0.0620$	$0.7314 \pm 0.0039$	$0.8622 \pm 0.0052$	$0.7475 \pm 0.0376$	0.8061
TF02-10291	29	Cu	$0.0847 \pm 0.0066$	$0.0796 \pm 0.0057$	$0.0896 \pm 0.0017$	$0.0970 \pm 0.0008$	$0.0346 \pm 0.0032$	0.0847
TF02-10291	30	Zn	$0.1684 \pm 0.0085$	$0.1785 \pm 0.0146$	$0.1518 \pm 0.0019$	$0.1710 \pm 0.0009$	$0.1177 \pm 0.0064$	0.1684
TF02-10291	31	Ga	not reported	$-0.0025 \pm 0.0034$	$0.0106 \pm 0.0010$	$0.0130 \pm 0.0002$	$0 \pm 0.0022$	-----
TF02-10291	33	As	$0.0060 \pm 0.0019$	$0.0091 \pm 0.0041$	$0.0165 \pm 0.0010$	$0.0123 \pm 0.0003$	$0.0033 \pm 0.0032$	-----
TF02-10291	34	Se	$0.0072 \pm 0.0010$	$0.0165 \pm 0.0028$	$0.0052 \pm 0.0007$	$0.0058 \pm 0.0002$	$0.0049 \pm 0.0016$	0.0058
TF02-10291	35	Br	$0.0359 \pm 0.0020$	$0.0227 \pm 0.0035$	$0.0187 \pm 0.0009$	$0.0275 \pm 0.0005$	$0.0210 \pm 0.0018$	0.0227
TF02-10291	37	Rb	$0.0029 \pm 0.0009$	$0.0022 \pm 0.0024$	$0.0020 \pm 0.0005$	$0.0003 \pm 0.0003$	$0.0011 \pm 0.0011$	-----
TF02-10291	38	Sr	$0.0390 \pm 0.0022$	$0.0508 \pm 0.0096$	$0.0434 \pm 0.0011$	$0.0418 \pm 0.0005$	$0.0367 \pm 0.0023$	0.0418
TF02-10291	39	Y	$0.0031 \pm 0.0010$	$-0.0102 \pm 0.0058$	$0.0021 \pm 0.0007$	$0 \pm 0.0003$	$0.0031 \pm 0.0013$	-----

Sample ID	Z	Element	CARB ( $\mu\text{g}/\text{cm}^2$ )	EPA ( $\mu\text{g}/\text{cm}^2$ )	STN Lab 1 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab2 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab3 ( $\mu\text{g}/\text{cm}^2$ )	Median* ( $\mu\text{g}/\text{cm}^2$ )
TF02-10291	40	Zr	0.0427 ± 0.0024	0.0429 ± 0.0088	0.1344 ± 0.0026	0.0591 ± 0.0006	0.0375 ± 0.0026	0.0429
TF02-10291	41	Nb	not reported	0.0082 ± 0.0066	0.0048 ± 0.0012	0 ± 0.0004	0 ± 0.0017	-----
TF02-10291	42	Mo	0.1184 ± 0.0062	0.1360 ± 0.0149	0.1205 ± 0.0068	0.1182 ± 0.0012	0.0726 ± 0.0043	0.1184
TF02-10291	47	Ag	not reported	0.0468 ± 0.0487	0.0044 ± 0.0028	0.0070 ± 0.0008	0 ± 0.0061	-----
TF02-10291	48	Cd	not reported	0.0227 ± 0.0237	0.0083 ± 0.0035	0.0059 ± 0.0011	0 ± 0.0062	-----
TF02-10291	49	In	not reported	not reported	0.0228 ± 0.0046	0 ± 0.0012	0.0065 ± 0.0064	-----
TF02-10291	50	Sn	< 0.0078	0.0324 ± 0.0178	0.0065 ± 0.0062	0.0345 ± 0.0014	0.0220 ± 0.0102	-----
TF02-10291	51	Sb	< 0.0091	0.5929 ± 0.0490	0.0659 ± 0.0087	0.0131 ± 0.0022	0.0090 ± 0.0078	-----
TF02-10291	55	Cs	not reported	0.0172 ± 0.0217	0 ± 0.0000	0 ± 0.0038	0 ± 0.0162	-----
TF02-10291	56	Ba	0.1377 ± 0.0178	0.1199 ± 0.0447	0 ± 0.0000	0.1119 ± 0.0022	0.2139 ± 0.0357	-----
TF02-10291	57	La	not reported	-0.0621 ± 0.0277	0 ± 0.0000	0 ± 0.0057	0 ± 0.0289	-----
TF02-10291	58	Ce	not reported	0.0164 ± 0.0225	0 ± 0.0000	0 ± 0.0051	0 ± 0.0351	-----
TF02-10291	62	Sm	not reported	not reported	0 ± 0.0000	0 ± 0.0170	0 ± 0.5768	-----
TF02-10291	63	Eu	not reported	not reported	0 ± 0.0000	0 ± 0.0306	1.8513 ± 2.4124	-----
TF02-10291	65	Tb	not reported	not reported	0 ± 0.0000	0 ± 0.0263	0 ± 1.1681	-----
TF02-10291	72	Hf	not reported	not reported	0 ± 0.0000	0 ± 0.0002	0 ± 0.0198	-----
TF02-10291	73	Ta	not reported	not reported	0 ± 0.0000	0 ± 0.0014	0 ± 0.0139	-----
TF02-10291	74	W	not reported	-0.0222 ± 0.0101	0 ± 0.0000	0 ± 0.0017	0 ± 0.0110	-----
TF02-10291	77	Ir	not reported	not reported	0.0006 ± 0.0000	0 ± 0.0001	0 ± 0.0044	-----
TF02-10291	79	Au	not reported	-0.0134 ± 0.0051	0.0019 ± 0.0018	0 ± 0.0003	0 ± 0.0038	-----
TF02-10291	80	Hg	< 0.0032	-0.0017 ± 0.0049	0.0083 ± 0.0018	0 ± 0.0002	0 ± 0.0031	-----
TF02-10291	82	Pb	0.0233 ± 0.0029	0.0253 ± 0.0074	0.0144 ± 0.0021	0.0171 ± 0.0004	0.0366 ± 0.0039	0.0233
TF02-10292	11	Na	not reported	0.0988 ± 0.0303	0.3643 ± 0.0239	0 ± 0.0109	0 ± 0.0880	-----
TF02-10292	12	Mg	not reported	0.2230 ± 0.0307	0.2739 ± 0.0082	0.1221 ± 0.0052	0.0068 ± 0.0295	-----
TF02-10292	13	Al	0.7094 ± 0.2109	0.8310 ± 0.0831	0.7588 ± 0.0081	0.6796 ± 0.0054	0.6695 ± 0.0774	0.7094
TF02-10292	14	Si	1.9723 ± 0.6242	2.3547 ± 0.1872	2.1343 ± 0.0224	1.9966 ± 0.0089	1.9779 ± 0.2285	1.9966
TF02-10292	15	P	0.0536 ± 0.0241	0.0268 ± 0.0304	0.1272 ± 0.0040	0.0858 ± 0.0030	0 ± 0.0060	-----
TF02-10292	16	S	3.0186 ± 0.1511	3.0757 ± 0.2286	2.8632 ± 0.0158	3.0905 ± 0.0125	3.0292 ± 0.3456	3.0292
TF02-10292	17	Cl	0.1927 ± 0.0563	0.2013 ± 0.0189	0.1562 ± 0.0047	0.0496 ± 0.0015	0.6981 ± 0.0800	0.1927
TF02-10292	19	K	0.4908 ± 0.0977	0.5156 ± 0.0273	0.5499 ± 0.0132	0.5016 ± 0.0088	0.5240 ± 0.0595	0.5156
TF02-10292	20	Ca	2.5335 ± 0.4261	2.4746 ± 0.1269	2.6647 ± 0.0214	2.6430 ± 0.0116	2.5903 ± 0.2930	2.5903

Sample ID	Z	Element	CARB ( $\mu\text{g}/\text{cm}^2$ )	EPA ( $\mu\text{g}/\text{cm}^2$ )	STN Lab 1 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab2 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab3 ( $\mu\text{g}/\text{cm}^2$ )	Median* ( $\mu\text{g}/\text{cm}^2$ )
TF02-10292	21	Sc	not reported	$-0.0062 \pm 0.0034$	$0 \pm 0.0000$	$0 \pm 0.0008$	$0 \pm 0.0187$	----
TF02-10292	22	Ti	$0.0853 \pm 0.0076$	$0.0756 \pm 0.0074$	$0.0993 \pm 0.0037$	$0.0975 \pm 0.0008$	$0.0665 \pm 0.0037$	0.0853
TF02-10292	23	V	$0.0139 \pm 0.0019$	$0.0040 \pm 0.0017$	$0.0017 \pm 0.0019$	$0.0100 \pm 0.0005$	$0.0010 \pm 0.0011$	----
TF02-10292	24	Cr	$0.5230 \pm 0.0263$	$0.4595 \pm 0.0240$	$0.5012 \pm 0.0051$	$0.4905 \pm 0.0022$	$0.4879 \pm 0.0248$	0.4905
TF02-10292	25	Mn	$0.4336 \pm 0.0219$	$0.4180 \pm 0.0312$	$0.4093 \pm 0.0044$	$0.4297 \pm 0.0024$	$0.4005 \pm 0.0209$	0.4180
TF02-10292	26	Fe	$1.6402 \pm 0.0821$	$1.6557 \pm 0.1189$	$1.6583 \pm 0.0076$	$1.7306 \pm 0.0072$	$1.7159 \pm 0.0860$	1.6583
TF02-10292	27	Co	$< 0.0050$	$0.0020 \pm 0.0030$	$0 \pm 0.0000$	$0 \pm 0.0032$	$0 \pm 0.0099$	----
TF02-10292	28	Ni	$0.0156 \pm 0.0010$	$0.0171 \pm 0.0022$	$0.0153 \pm 0.0007$	$0.0145 \pm 0.0003$	$0.0125 \pm 0.0010$	0.0153
TF02-10292	29	Cu	$0.0113 \pm 0.0009$	$0.0107 \pm 0.0020$	$0.0156 \pm 0.0009$	$0.0130 \pm 0.0002$	$0.0105 \pm 0.0009$	0.0113
TF02-10292	30	Zn	$0.1018 \pm 0.0052$	$0.0988 \pm 0.0090$	$0.0999 \pm 0.0015$	$0.0920 \pm 0.0007$	$0.0959 \pm 0.0049$	0.0988
TF02-10292	31	Ga	not reported	$-0.0126 \pm 0.0026$	$0.0015 \pm 0.0007$	$0.0030 \pm 0.0002$	$0.0013 \pm 0.0014$	----
TF02-10292	33	As	$0.0069 \pm 0.0017$	$0.0003 \pm 0.0038$	$0.0036 \pm 0.0008$	$0.0057 \pm 0.0004$	$0.0061 \pm 0.0025$	----
TF02-10292	34	Se	$0.0071 \pm 0.0009$	$0.0095 \pm 0.0023$	$0.0070 \pm 0.0006$	$0.0065 \pm 0.0003$	$0.0060 \pm 0.0010$	0.0070
TF02-10292	35	Br	$0.0148 \pm 0.0010$	$0.0150 \pm 0.0027$	$0.0141 \pm 0.0007$	$0.0153 \pm 0.0002$	$0.0179 \pm 0.0014$	0.0150
TF02-10292	37	Rb	$0.0020 \pm 0.0022$	$0.0055 \pm 0.0022$	$0.0043 \pm 0.0005$	$0.0027 \pm 0.0002$	$0.0002 \pm 0.0009$	----
TF02-10292	38	Sr	$0.0082 \pm 0.0009$	$0.0031 \pm 0.0061$	$0.0102 \pm 0.0007$	$0.0069 \pm 0.0003$	$0.0042 \pm 0.0011$	----
TF02-10292	39	Y	$0.0027 \pm 0.0009$	$0.0119 \pm 0.0066$	$0.0004 \pm 0.0007$	$0 \pm 0.0004$	$0 \pm 0.0012$	----
TF02-10292	40	Zr	$0.0635 \pm 0.0034$	$0.0760 \pm 0.0104$	$0.1163 \pm 0.0023$	$0.0693 \pm 0.0008$	$0.0549 \pm 0.0032$	0.0693
TF02-10292	41	Nb	not reported	$0.0022 \pm 0.0054$	$0 \pm 0.0000$	$0 \pm 0.0005$	$0 \pm 0.0016$	----
TF02-10292	42	Mo	$0.0117 \pm 0.0017$	$0.0304 \pm 0.0075$	$0.0109 \pm 0.0033$	$0.0002 \pm 0.0005$	$0.0048 \pm 0.0020$	----
TF02-10292	47	Ag	not reported	$0.0016 \pm 0.0293$	$0.0030 \pm 0.0024$	$0 \pm 0.0008$	$0.0040 \pm 0.0039$	----
TF02-10292	48	Cd	not reported	$0 \pm 0.0100$	$0.0036 \pm 0.0030$	$0.0035 \pm 0.0010$	$0.0066 \pm 0.0041$	----
TF02-10292	49	In	not reported	not reported	$0.0023 \pm 0.0043$	$0.0104 \pm 0.0011$	$0 \pm 0.0043$	----
TF02-10292	50	Sn	$0.0202 \pm 0.0041$	$0.0048 \pm 0.0089$	$0 \pm 0.0000$	$0 \pm 0.0012$	$0.0111 \pm 0.0052$	----
TF02-10292	51	Sb	$0.0102 \pm 0.0139$	$0.0773 \pm 0.0153$	$0.0610 \pm 0.0083$	$0.0018 \pm 0.0019$	$0 \pm 0.0055$	----
TF02-10292	55	Cs	not reported	$0.0111 \pm 0.0060$	$0 \pm 0.0000$	$0 \pm 0.0022$	$0 \pm 0.0141$	----
TF02-10292	56	Ba	$< 0.0290$	$0.0312 \pm 0.0109$	$0 \pm 0.0000$	$0.0353 \pm 0.0020$	$0.0251 \pm 0.0199$	----
TF02-10292	57	La	not reported	$0.0110 \pm 0.0065$	$0 \pm 0.0000$	$0 \pm 0.0009$	$0.0125 \pm 0.0269$	----
TF02-10292	58	Ce	not reported	$-0.0001 \pm 0.0054$	$0 \pm 0.0000$	$0.0393 \pm 0.0002$	$0 \pm 0.0330$	----
TF02-10292	62	Sm	not reported	not reported	$0.0200 \pm 0.0059$	$0 \pm 0.0017$	$0 \pm 0.0092$	----
TF02-10292	63	Eu	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0029$	$0.0402 \pm 0.1261$	----



Sample ID	Z	Element	CARB ( $\mu\text{g}/\text{cm}^2$ )	EPA ( $\mu\text{g}/\text{cm}^2$ )	STN Lab 1 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab2 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab3 ( $\mu\text{g}/\text{cm}^2$ )	Median* ( $\mu\text{g}/\text{cm}^2$ )
TF02-10292	65	Tb	not reported	not reported	$0 \pm 0.0000$	$0.0131 \pm 0.0112$	$0.0020 \pm 0.0645$	-----
TF02-10292	72	Hf	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0002$	$0.0293 \pm 0.0116$	-----
TF02-10292	73	Ta	not reported	not reported	$0.0023 \pm 0.0009$	$0 \pm 0.0009$	$0.0082 \pm 0.0086$	-----
TF02-10292	74	W	not reported	$0.0014 \pm 0.0072$	$0.0036 \pm 0.0027$	$0 \pm 0.0013$	$0 \pm 0.0076$	-----
TF02-10292	77	Ir	not reported	not reported	$0.0004 \pm 0.0000$	$0 \pm 0.0001$	$0.0004 \pm 0.0027$	-----
TF02-10292	79	Au	not reported	$-0.0073 \pm 0.0043$	$0.0004 \pm 0.0014$	$0 \pm 0.0003$	$0 \pm 0.0026$	-----
TF02-10292	80	Hg	$< 0.0032$	$-0.0049 \pm 0.0044$	$0.0015 \pm 0.0014$	$0 \pm 0.0002$	$0.0022 \pm 0.0019$	-----
TF02-10292	82	Pb	$0.0246 \pm 0.0026$	$0.0395 \pm 0.0073$	$0.0292 \pm 0.0018$	$0.0278 \pm 0.0005$	$0.0298 \pm 0.0030$	0.0292
TF02-10293	11	Na	not reported	$0.0666 \pm 0.0200$	$0.1627 \pm 0.0222$	$0 \pm 0.0050$	$0 \pm 0.0742$	-----
TF02-10293	12	Mg	not reported	$0.0436 \pm 0.0144$	$0.0687 \pm 0.0070$	$0 \pm 0.0014$	$0 \pm 0.0233$	-----
TF02-10293	13	Al	$0.2701 \pm 0.0804$	$0.2278 \pm 0.0365$	$0.2469 \pm 0.0068$	$0.2132 \pm 0.0012$	$0.1422 \pm 0.0210$	0.2278
TF02-10293	14	Si	$0.5800 \pm 0.1836$	$0.6733 \pm 0.0609$	$0.6629 \pm 0.0139$	$0.5729 \pm 0.0044$	$0.5614 \pm 0.0643$	0.5800
TF02-10293	15	P	$0.0120 \pm 0.0228$	$-0.0214 \pm 0.0209$	$0.0148 \pm 0.0035$	$0.0207 \pm 0.0035$	$0 \pm 0.0050$	-----
TF02-10293	16	S	$2.7420 \pm 0.1373$	$2.7263 \pm 0.1999$	$2.7327 \pm 0.0152$	$2.8909 \pm 0.0118$	$2.8097 \pm 0.3175$	2.7420
TF02-10293	17	Cl	$0.0360 \pm 0.0122$	$0.0700 \pm 0.0101$	$0.0471 \pm 0.0036$	$0.0071 \pm 0.0005$	$0.1857 \pm 0.0219$	-----
TF02-10293	19	K	$0.1664 \pm 0.0334$	$0.1902 \pm 0.0107$	$0.2082 \pm 0.0082$	$0.1829 \pm 0.0009$	$0.1791 \pm 0.0204$	0.1829
TF02-10293	20	Ca	$0.7027 \pm 0.1184$	$0.7305 \pm 0.0379$	$0.8211 \pm 0.0120$	$0.7684 \pm 0.0028$	$0.7719 \pm 0.0869$	0.7684
TF02-10293	21	Sc	not reported	$0.0022 \pm 0.0024$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0.0013 \pm 0.0058$	-----
TF02-10293	22	Ti	$0.0317 \pm 0.0063$	$0.0311 \pm 0.0045$	$0.0558 \pm 0.0027$	$0.0431 \pm 0.0004$	$0.0348 \pm 0.0022$	0.0348
TF02-10293	23	V	$0.0085 \pm 0.0017$	$0.0049 \pm 0.0015$	$0.0038 \pm 0.0015$	$0.0090 \pm 0.0003$	$0.0044 \pm 0.0008$	-----
TF02-10293	24	Cr	$0.1085 \pm 0.0057$	$0.1007 \pm 0.0058$	$0.1122 \pm 0.0025$	$0.1052 \pm 0.0008$	$0.1012 \pm 0.0052$	0.1052
TF02-10293	25	Mn	$0.1039 \pm 0.0054$	$0.0963 \pm 0.0083$	$0.0941 \pm 0.0022$	$0.0993 \pm 0.0007$	$0.0962 \pm 0.0053$	0.0963
TF02-10293	26	Fe	$0.6533 \pm 0.0328$	$0.6852 \pm 0.0497$	$0.7179 \pm 0.0049$	$0.6956 \pm 0.0054$	$0.7239 \pm 0.0364$	0.6956
TF02-10293	27	Co	$< 0.0050$	$-0.0015 \pm 0.0024$	$0 \pm 0.0000$	$0 \pm 0.0004$	$0 \pm 0.0043$	-----
TF02-10293	28	Ni	$0.0044 \pm 0.0005$	$0.0062 \pm 0.0015$	$0.0041 \pm 0.0006$	$0.0048 \pm 0.0002$	$0.0047 \pm 0.0006$	0.0047
TF02-10293	29	Cu	$0.0252 \pm 0.0015$	$0.0257 \pm 0.0028$	$0.0309 \pm 0.0010$	$0.0290 \pm 0.0003$	$0.0271 \pm 0.0016$	0.0271
TF02-10293	30	Zn	$0.0684 \pm 0.0035$	$0.0611 \pm 0.0064$	$0.0661 \pm 0.0013$	$0.0600 \pm 0.0004$	$0.0642 \pm 0.0034$	0.0642
TF02-10293	31	Ga	not reported	$-0.0085 \pm 0.0027$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0013$	-----
TF02-10293	33	As	$0.0038 \pm 0.0046$	$-0.0011 \pm 0.0034$	$0 \pm 0.0000$	$0.0006 \pm 0.0002$	$0.0039 \pm 0.0019$	-----
TF02-10293	34	Se	$0.0080 \pm 0.0009$	$0.0106 \pm 0.0023$	$0.0082 \pm 0.0006$	$0.0091 \pm 0.0003$	$0.0096 \pm 0.0011$	0.0091
TF02-10293	35	Br	$0.0089 \pm 0.0008$	$0.0101 \pm 0.0024$	$0.0087 \pm 0.0006$	$0.0089 \pm 0.0003$	$0.0144 \pm 0.0012$	0.0089

Sample ID	Z	Element	CARB ( $\mu\text{g}/\text{cm}^2$ )	EPA ( $\mu\text{g}/\text{cm}^2$ )	STN Lab 1 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab2 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab3 ( $\mu\text{g}/\text{cm}^2$ )	Median* ( $\mu\text{g}/\text{cm}^2$ )
TF02-10293	37	Rb	< 0.0013	$0.0050 \pm 0.0022$	$0.0008 \pm 0.0004$	$0 \pm 0.0002$	$0 \pm 0.0009$	-----
TF02-10293	38	Sr	$0.0028 \pm 0.0007$	$-0.0017 \pm 0.0054$	$0.0007 \pm 0.0006$	$0.0015 \pm 0.0002$	$0 \pm 0.0010$	-----
TF02-10293	39	Y	< 0.0016	$0.0136 \pm 0.0065$	$0.0017 \pm 0.0007$	$0 \pm 0.0002$	$0 \pm 0.0012$	-----
TF02-10293	40	Zr	$0.0052 \pm 0.0010$	$0.0056 \pm 0.0057$	$0.0114 \pm 0.0015$	$0.0030 \pm 0.0002$	$0 \pm 0.0014$	-----
TF02-10293	41	Nb	not reported	$-0.0102 \pm 0.0049$	$0 \pm 0.0000$	$0 \pm 0.0003$	$0.0018 \pm 0.0017$	-----
TF02-10293	42	Mo	< 0.0029	$0.0021 \pm 0.0060$	$0 \pm 0.0000$	$0 \pm 0.0003$	$0.0003 \pm 0.0019$	-----
TF02-10293	47	Ag	not reported	$0.0372 \pm 0.0242$	$0 \pm 0.0000$	$0.0010 \pm 0.0008$	$0.0015 \pm 0.0038$	-----
TF02-10293	48	Cd	not reported	$-0.0152 \pm 0.0077$	$0 \pm 0.0000$	$0 \pm 0.0008$	$0.0025 \pm 0.0039$	-----
TF02-10293	49	In	not reported	not reported	$0 \pm 0.0000$	$0.0063 \pm 0.0009$	$0 \pm 0.0042$	-----
TF02-10293	50	Sn	$0.0191 \pm 0.0040$	$0.0017 \pm 0.0060$	$0 \pm 0.0000$	$0.0200 \pm 0.0021$	$0.0144 \pm 0.0049$	-----
TF02-10293	51	Sb	$0.0135 \pm 0.0137$	$0.0283 \pm 0.0094$	$0 \pm 0.0000$	$0 \pm 0.0018$	$0 \pm 0.0055$	-----
TF02-10293	55	Cs	not reported	$-0.0013 \pm 0.0042$	$0 \pm 0.0000$	$0 \pm 0.0012$	$0 \pm 0.0142$	-----
TF02-10293	56	Ba	< 0.0290	$0.0218 \pm 0.0083$	$0 \pm 0.0000$	$0.0341 \pm 0.0018$	$0.0488 \pm 0.0201$	-----
TF02-10293	57	La	not reported	$0.0142 \pm 0.0054$	$0 \pm 0.0000$	$0.0070 \pm 0.0010$	$0.0112 \pm 0.0272$	-----
TF02-10293	58	Ce	not reported	$0.0010 \pm 0.0043$	$0 \pm 0.0000$	$0 \pm 0.0013$	$0 \pm 0.0331$	-----
TF02-10293	62	Sm	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0004$	$0 \pm 0.0035$	-----
TF02-10293	63	Eu	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0008$	$0 \pm 0.0313$	-----
TF02-10293	65	Tb	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0009$	$0 \pm 0.0276$	-----
TF02-10293	72	Hf	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0002$	$0.0139 \pm 0.0113$	-----
TF02-10293	73	Ta	not reported	not reported	$0.0042 \pm 0.0011$	$0 \pm 0.0006$	$0.0001 \pm 0.0082$	-----
TF02-10293	74	W	not reported	$0.0086 \pm 0.0071$	$0.0125 \pm 0.0024$	$0 \pm 0.0010$	$0 \pm 0.0067$	-----
TF02-10293	77	Ir	not reported	not reported	$0.0004 \pm 0.0000$	$0 \pm 0.0001$	$0 \pm 0.0025$	-----
TF02-10293	79	Au	not reported	$-0.0089 \pm 0.0042$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0023$	-----
TF02-10293	80	Hg	< 0.0032	$-0.0138 \pm 0.0041$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0.0030 \pm 0.0018$	-----
TF02-10293	82	Pb	$0.0097 \pm 0.0023$	$0.0182 \pm 0.0066$	$0.0192 \pm 0.0014$	$0.0159 \pm 0.0003$	$0.0158 \pm 0.0026$	-----
TF02-10294	11	Na	not reported	$0.1070 \pm 0.0345$	$0.2645 \pm 0.0238$	$0 \pm 0.0079$	$0.1946 \pm 0.0801$	-----
TF02-10294	12	Mg	not reported	$0.0176 \pm 0.0131$	$0 \pm 0.0000$	$0 \pm 0.0025$	$0 \pm 0.0211$	-----
TF02-10294	13	Al	$0.1092 \pm 0.0326$	$0.0343 \pm 0.0255$	$0.0366 \pm 0.0067$	$0.0293 \pm 0.0009$	$0.0179 \pm 0.0117$	-----
TF02-10294	14	Si	$0.2263 \pm 0.0717$	$0.2074 \pm 0.0319$	$0.2173 \pm 0.0108$	$0.1872 \pm 0.0012$	$0.2115 \pm 0.0251$	0.2115
TF02-10294	15	P	$0.0090 \pm 0.0299$	$0.0555 \pm 0.0220$	$0 \pm 0.0000$	$0.0022 \pm 0.0025$	$0 \pm 0.0055$	-----
TF02-10294	16	S	$3.7047 \pm 0.1854$	$3.6259 \pm 0.2643$	$3.5001 \pm 0.0172$	$3.6998 \pm 0.0118$	$3.6531 \pm 0.4123$	3.6531

Sample ID	Z	Element	CARB ( $\mu\text{g}/\text{cm}^2$ )	EPA ( $\mu\text{g}/\text{cm}^2$ )	STN Lab 1 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab2 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab3 ( $\mu\text{g}/\text{cm}^2$ )	Median* ( $\mu\text{g}/\text{cm}^2$ )
TF02-10294	17	Cl	< 0.0061	0.0397 ± 0.0083	0.0165 ± 0.0033	0 ± 0.0012	0.0327 ± 0.0073	-----
TF02-10294	19	K	0.3014 ± 0.0601	0.2817 ± 0.0152	0.3086 ± 0.0097	0.2875 ± 0.0012	0.2897 ± 0.0328	0.2897
TF02-10294	20	Ca	0.2027 ± 0.0351	0.1079 ± 0.0066	0.1303 ± 0.0056	0.1266 ± 0.0010	0.1166 ± 0.0134	0.1266
TF02-10294	21	Sc	not reported	0.0012 ± 0.0016	0 ± 0.0000	0 ± 0.0005	0 ± 0.0013	-----
TF02-10294	22	Ti	< 0.0038	0.0090 ± 0.0031	0.0053 ± 0.0019	0.0040 ± 0.0002	0.0103 ± 0.0012	-----
TF02-10294	23	V	0.0166 ± 0.0019	0.0097 ± 0.0016	0.0092 ± 0.0015	0.0150 ± 0.0002	0.0124 ± 0.0009	0.0124
TF02-10294	24	Cr	0.0152 ± 0.0014	0.0143 ± 0.0016	0.0157 ± 0.0011	0.0150 ± 0.0003	0.0159 ± 0.0011	0.0152
TF02-10294	25	Mn	0.0102 ± 0.0010	0.0082 ± 0.0021	0.0052 ± 0.0009	0.0041 ± 0.0002	0.0093 ± 0.0012	0.0082
TF02-10294	26	Fe	0.2515 ± 0.0127	0.2570 ± 0.0193	0.2676 ± 0.0030	0.2348 ± 0.0024	0.2695 ± 0.0137	0.2570
TF02-10294	27	Co	< 0.0050	0.0030 ± 0.0020	0 ± 0.0000	0 ± 0.0004	0 ± 0.0017	-----
TF02-10294	28	Ni	0.0181 ± 0.0011	0.0193 ± 0.0023	0.0193 ± 0.0007	0.0155 ± 0.0003	0.0174 ± 0.0011	0.0181
TF02-10294	29	Cu	0.0055 ± 0.0007	0.0130 ± 0.0019	0.0108 ± 0.0008	0.0100 ± 0.0001	0.0052 ± 0.0007	0.0100
TF02-10294	30	Zn	0.2099 ± 0.0106	0.2157 ± 0.0171	0.1906 ± 0.0020	0.1970 ± 0.0010	0.1949 ± 0.0099	0.1970
TF02-10294	31	Ga	not reported	-0.0085 ± 0.0025	0.0001 ± 0.0006	0 ± 0.0002	0.0019 ± 0.0012	-----
TF02-10294	33	As	0.0064 ± 0.0016	-0.0007 ± 0.0032	0.0000 ± 0.0006	0.0013 ± 0.0004	0.0012 ± 0.0018	-----
TF02-10294	34	Se	0.0034 ± 0.0008	0.0090 ± 0.0022	0.0035 ± 0.0004	0.0005 ± 0.0002	0.0022 ± 0.0008	-----
TF02-10294	35	Br	0.0099 ± 0.0008	0.0121 ± 0.0026	0.0107 ± 0.0006	0.0091 ± 0.0003	0.0143 ± 0.0012	0.0107
TF02-10294	37	Rb	0.0017 ± 0.0020	0.0042 ± 0.0020	0 ± 0.0000	0.0004 ± 0.0003	0 ± 0.0009	-----
TF02-10294	38	Sr	0.0077 ± 0.0008	0.0072 ± 0.0066	0.0086 ± 0.0006	0.0039 ± 0.0002	0.0037 ± 0.0010	-----
TF02-10294	39	Y	0.0020 ± 0.0024	0.0037 ± 0.0060	0 ± 0.0000	0 ± 0.0004	0.0015 ± 0.0012	-----
TF02-10294	40	Zr	0.0044 ± 0.0009	0.0064 ± 0.0053	0.0038 ± 0.0013	0 ± 0.0003	0.0017 ± 0.0014	-----
TF02-10294	41	Nb	not reported	-0.0035 ± 0.0049	0.0055 ± 0.0010	0 ± 0.0004	0 ± 0.0016	-----
TF02-10294	42	Mo	0.0061 ± 0.0015	0.0040 ± 0.0058	0.0045 ± 0.0027	0.0046 ± 0.0005	0.0043 ± 0.0018	-----
TF02-10294	47	Ag	not reported	0.0102 ± 0.0224	0 ± 0.0000	0 ± 0.0008	0.0048 ± 0.0038	-----
TF02-10294	48	Cd	not reported	-0.0140 ± 0.0070	0.0015 ± 0.0028	0 ± 0.0009	0.0004 ± 0.0038	-----
TF02-10294	49	In	not reported	not reported	0.0129 ± 0.0043	0.0075 ± 0.0011	0.0078 ± 0.0041	-----
TF02-10294	50	Sn	0.0205 ± 0.0040	0.0339 ± 0.0064	0 ± 0.0000	0.0261 ± 0.0012	0.0186 ± 0.0069	-----
TF02-10294	51	Sb	0.0098 ± 0.0135	0.0060 ± 0.0063	0.0387 ± 0.0080	0.0260 ± 0.0021	0 ± 0.0053	-----
TF02-10294	55	Cs	not reported	-0.0045 ± 0.0034	0.0025 ± 0.0034	0 ± 0.0008	0.0371 ± 0.0138	-----
TF02-10294	56	Ba	< 0.0290	0.0042 ± 0.0066	0.0274 ± 0.0039	0 ± 0.0017	0.0869 ± 0.0278	-----
TF02-10294	57	La	not reported	0.0136 ± 0.0049	0.0048 ± 0.0035	0.0140 ± 0.0010	0.0303 ± 0.0260	-----

Sample ID	Z	Element	CARB ( $\mu\text{g}/\text{cm}^2$ )	EPA ( $\mu\text{g}/\text{cm}^2$ )	STN Lab 1 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab2 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab3 ( $\mu\text{g}/\text{cm}^2$ )	Median* ( $\mu\text{g}/\text{cm}^2$ )
TF02-10294	58	Ce	not reported	$0.0020 \pm 0.0036$	$0.0041 \pm 0.0039$	$0.0100 \pm 0.0009$	$0 \pm 0.0321$	-----
TF02-10294	62	Sm	not reported	not reported	$0.0115 \pm 0.0018$	$0 \pm 0.0008$	$0 \pm 0.0024$	-----
TF02-10294	63	Eu	not reported	not reported	$0.0211 \pm 0.0020$	$0 \pm 0.0013$	$0 \pm 0.0059$	-----
TF02-10294	65	Tb	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0020$	$0 \pm 0.0110$	-----
TF02-10294	72	Hf	not reported	not reported	$0.0001 \pm 0.0000$	$0 \pm 0.0002$	$0.0063 \pm 0.0107$	-----
TF02-10294	73	Ta	not reported	not reported	$0.0028 \pm 0.0009$	$0 \pm 0.0005$	$0.0180 \pm 0.0082$	-----
TF02-10294	74	W	not reported	$-0.0232 \pm 0.0070$	$0.0038 \pm 0.0033$	$0 \pm 0.0011$	$0 \pm 0.0103$	-----
TF02-10294	77	Ir	not reported	not reported	$0.0010 \pm 0.0000$	$0 \pm 0.0001$	$0.0001 \pm 0.0024$	-----
TF02-10294	79	Au	not reported	$0.0008 \pm 0.0041$	$0.0036 \pm 0.0017$	$0 \pm 0.0002$	$0 \pm 0.0031$	-----
TF02-10294	80	Hg	$< 0.0032$	$0.0020 \pm 0.0043$	$0.0031 \pm 0.0014$	$0 \pm 0.0002$	$0.0005 \pm 0.0017$	-----
TF02-10294	82	Pb	$0.0093 \pm 0.0022$	$0.0223 \pm 0.0062$	$0.0170 \pm 0.0014$	$0.0126 \pm 0.0003$	$0.0153 \pm 0.0024$	0.0153
TF02-10295	11	Na	not reported	$0.1624 \pm 0.0230$	$0.2081 \pm 0.0220$	$0 \pm 0.0077$	$0.1168 \pm 0.0702$	-----
TF02-10295	12	Mg	not reported	$0.0403 \pm 0.0124$	$0 \pm 0.0000$	$0 \pm 0.0016$	$0 \pm 0.0204$	-----
TF02-10295	13	Al	$0.0828 \pm 0.0248$	$-0.0239 \pm 0.0221$	$0.0254 \pm 0.0064$	$0.0233 \pm 0.0009$	$0.0311 \pm 0.0108$	-----
TF02-10295	14	Si	$0.1996 \pm 0.0633$	$0.1493 \pm 0.0289$	$0.1720 \pm 0.0098$	$0.1632 \pm 0.0025$	$0.1894 \pm 0.0224$	0.1720
TF02-10295	15	P	$0.0112 \pm 0.0212$	$-0.0158 \pm 0.0184$	$0.0170 \pm 0.0033$	$0.0045 \pm 0.0039$	$0 \pm 0.0047$	-----
TF02-10295	16	S	$2.5496 \pm 0.1277$	$2.4976 \pm 0.1830$	$2.4511 \pm 0.0143$	$2.5715 \pm 0.0104$	$2.4336 \pm 0.2741$	2.4976
TF02-10295	17	Cl	$< 0.0061$	$0.0288 \pm 0.0075$	$0.0016 \pm 0.0029$	$0 \pm 0.0003$	$0 \pm 0.0050$	-----
TF02-10295	19	K	$0.0908 \pm 0.0187$	$0.1019 \pm 0.0063$	$0.1116 \pm 0.0063$	$0.1003 \pm 0.0008$	$0.0938 \pm 0.0108$	0.1003
TF02-10295	20	Ca	$0.0967 \pm 0.0179$	$0.0933 \pm 0.0058$	$0.1145 \pm 0.0048$	$0.1025 \pm 0.0006$	$0.0953 \pm 0.0109$	0.0967
TF02-10295	21	Sc	not reported	$-0.0010 \pm 0.0016$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0012$	-----
TF02-10295	22	Ti	$< 0.0038$	$0.0083 \pm 0.0031$	$0.0152 \pm 0.0021$	$0.0050 \pm 0.0002$	$0.0137 \pm 0.0013$	-----
TF02-10295	23	V	$0.0114 \pm 0.0017$	$0.0018 \pm 0.0013$	$0.0064 \pm 0.0014$	$0.0070 \pm 0.0003$	$0.0061 \pm 0.0007$	-----
TF02-10295	24	Cr	$< 0.0021$	$-0.0001 \pm 0.0010$	$0.0048 \pm 0.0007$	$0.0010 \pm 0.0002$	$0.0015 \pm 0.0006$	-----
TF02-10295	25	Mn	$0.0039 \pm 0.0009$	$0.0054 \pm 0.0018$	$0 \pm 0.0000$	$0.0026 \pm 0.0001$	$0.0019 \pm 0.0009$	-----
TF02-10295	26	Fe	$0.1833 \pm 0.0093$	$0.1913 \pm 0.0146$	$0.1910 \pm 0.0026$	$0.1711 \pm 0.0012$	$0.1979 \pm 0.0101$	0.1910
TF02-10295	27	Co	$< 0.0050$	$-0.0022 \pm 0.0017$	$0 \pm 0.0000$	$0 \pm 0.0004$	$0 \pm 0.0013$	-----
TF02-10295	28	Ni	$0.0048 \pm 0.0005$	$0.0045 \pm 0.0014$	$0.0051 \pm 0.0005$	$0.0039 \pm 0.0002$	$0.0043 \pm 0.0006$	0.0045
TF02-10295	29	Cu	$0.0113 \pm 0.0009$	$0.0066 \pm 0.0017$	$0.0162 \pm 0.0009$	$0.0070 \pm 0.0001$	$0.0065 \pm 0.0007$	0.0070
TF02-10295	30	Zn	$0.0275 \pm 0.0015$	$0.0159 \pm 0.0034$	$0.0223 \pm 0.0010$	$0.0130 \pm 0.0001$	$0.0219 \pm 0.0013$	0.0219
TF02-10295	31	Ga	not reported	$-0.0099 \pm 0.0027$	$0.0009 \pm 0.0006$	$0 \pm 0.0001$	$0.0044 \pm 0.0012$	-----

Sample ID	Z	Element	CARB ( $\mu\text{g}/\text{cm}^2$ )	EPA ( $\mu\text{g}/\text{cm}^2$ )	STN Lab 1 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab2 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab3 ( $\mu\text{g}/\text{cm}^2$ )	Median* ( $\mu\text{g}/\text{cm}^2$ )
TF02-10295	33	As	$0.0039 \pm 0.0046$	$-0.0003 \pm 0.0029$	$0.0006 \pm 0.0005$	$0.0002 \pm 0.0001$	$0.0029 \pm 0.0011$	-----
TF02-10295	34	Se	$0.0038 \pm 0.0008$	$0.0103 \pm 0.0022$	$0.0021 \pm 0.0004$	$0.0019 \pm 0.0001$	$0.0016 \pm 0.0009$	-----
TF02-10295	35	Br	$0.0059 \pm 0.0007$	$0.0107 \pm 0.0024$	$0.0036 \pm 0.0005$	$0.0024 \pm 0.0001$	$0.0067 \pm 0.0009$	0.0059
TF02-10295	37	Rb	< 0.0013	$0.0060 \pm 0.0022$	$0.0009 \pm 0.0004$	$0 \pm 0.0001$	$0 \pm 0.0008$	-----
TF02-10295	38	Sr	< 0.0014	$0.0031 \pm 0.0062$	$0.0002 \pm 0.0005$	$0 \pm 0.0002$	$0 \pm 0.0010$	-----
TF02-10295	39	Y	< 0.0016	$0.0019 \pm 0.0060$	$0.0004 \pm 0.0006$	$0 \pm 0.0002$	$0 \pm 0.0012$	-----
TF02-10295	40	Zr	$0.0024 \pm 0.0028$	$0.0028 \pm 0.0054$	$0.0081 \pm 0.0013$	$0 \pm 0.0002$	$0 \pm 0.0014$	-----
TF02-10295	41	Nb	not reported	$0.0116 \pm 0.0058$	$0 \pm 0.0000$	$0 \pm 0.0003$	$0 \pm 0.0016$	-----
TF02-10295	42	Mo	$0.0026 \pm 0.0044$	$0.0168 \pm 0.0064$	$0.0029 \pm 0.0022$	$0 \pm 0.0003$	$0.0012 \pm 0.0018$	-----
TF02-10295	47	Ag		$0.0072 \pm 0.0225$	$0.0014 \pm 0.0024$	$0.0006 \pm 0.0007$	$0.0080 \pm 0.0037$	-----
TF02-10295	48	Cd	not reported	$-0.0109 \pm 0.0064$	$0.0030 \pm 0.0029$	$0 \pm 0.0008$	$0 \pm 0.0037$	-----
TF02-10295	49	In	not reported	not reported	$0.0053 \pm 0.0039$	$0 \pm 0.0009$	$0 \pm 0.0040$	-----
TF02-10295	50	Sn	$0.0273 \pm 0.0041$	$0.0183 \pm 0.0052$	$0.0040 \pm 0.0054$	$0.0206 \pm 0.0012$	$0.0165 \pm 0.0068$	-----
TF02-10295	51	Sb	< 0.0091	$0.0037 \pm 0.0058$	$0.0046 \pm 0.0078$	$0 \pm 0.0018$	$0.0021 \pm 0.0054$	-----
TF02-10295	55	Cs	not reported	$-0.0054 \pm 0.0034$	$0 \pm 0.0000$	$0 \pm 0.0012$	$0 \pm 0.0140$	-----
TF02-10295	56	Ba	$0.0469 \pm 0.0146$	$0.0178 \pm 0.0066$	$0.0241 \pm 0.0043$	$0 \pm 0.0017$	$0.0762 \pm 0.0282$	-----
TF02-10295	57	La	not reported	$0.0104 \pm 0.0047$	$0 \pm 0.0000$	$0.0080 \pm 0.0012$	$0 \pm 0.0258$	-----
TF02-10295	58	Ce	not reported	$0.0074 \pm 0.0036$	$0 \pm 0.0000$	$0.0060 \pm 0.0013$	$0.0350 \pm 0.0323$	-----
TF02-10295	62	Sm	not reported	not reported	$0.0231 \pm 0.0015$	$0 \pm 0.0004$	$0 \pm 0.0025$	-----
TF02-10295	63	Eu	not reported	not reported	$0.0418 \pm 0.0015$	$0 \pm 0.0007$	$0 \pm 0.0046$	-----
TF02-10295	65	Tb	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0009$	$0 \pm 0.0084$	-----
TF02-10295	72	Hf	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0110$	-----
TF02-10295	73	Ta	not reported	not reported	$0.0021 \pm 0.0009$	$0 \pm 0.0006$	$0.0275 \pm 0.0112$	-----
TF02-10295	74	W	not reported	$0.0004 \pm 0.0061$	$0.0020 \pm 0.0019$	$0 \pm 0.0009$	$0 \pm 0.0060$	-----
TF02-10295	77	Ir	not reported	not reported	$0.0002 \pm 0.0000$	$0 \pm 0.0001$	$0.0065 \pm 0.0024$	-----
TF02-10295	79	Au	not reported	$-0.0121 \pm 0.0039$	$0.0051 \pm 0.0011$	$0 \pm 0.0002$	$0.0011 \pm 0.0021$	-----
TF02-10295	80	Hg	< 0.0032	$-0.0074 \pm 0.0042$	$0.0059 \pm 0.0012$	$0 \pm 0.0002$	$0 \pm 0.0018$	-----
TF02-10295	82	Pb	< 0.0043	$0.0025 \pm 0.0055$	$0.0080 \pm 0.0011$	$0.0073 \pm 0.0003$	$0.0061 \pm 0.0023$	-----
TF02-10296	11	Na	not reported	$0.1307 \pm 0.0237$	$0.2101 \pm 0.0194$	$0 \pm 0.0149$	$0.0950 \pm 0.0653$	-----
TF02-10296	12	Mg	not reported	$0.0470 \pm 0.0131$	$0 \pm 0.0000$	$0 \pm 0.0019$	$0 \pm 0.0188$	-----
TF02-10296	13	Al	$0.0667 \pm 0.0201$	$0.0266 \pm 0.0229$	$0 \pm 0.0000$	$0.0146 \pm 0.0008$	$0.0307 \pm 0.0098$	-----

Sample ID	Z	Element	CARB ( $\mu\text{g}/\text{cm}^2$ )	EPA ( $\mu\text{g}/\text{cm}^2$ )	STN Lab 1 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab2 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab3 ( $\mu\text{g}/\text{cm}^2$ )	Median* ( $\mu\text{g}/\text{cm}^2$ )
TF02-10296	14	Si	0.2155 ± 0.0683	0.0960 ± 0.0268	0.1952 ± 0.0088	0.1914 ± 0.0024	0.1949 ± 0.0228	0.1949
TF02-10296	15	P	0.0099 ± 0.0049	-0.0151 ± 0.0145	0.0566 ± 0.0026	0.0207 ± 0.0019	0 ± 0.0036	-----
TF02-10296	16	S	0.8282 ± 0.0416	0.7603 ± 0.0597	0.7516 ± 0.0082	0.8249 ± 0.0046	0.7843 ± 0.0888	0.7843
TF02-10296	17	Cl	0.0341 ± 0.0105	0.0397 ± 0.0079	0.0272 ± 0.0027	0.0100 ± 0.0005	0.1641 ± 0.0193	0.0341
TF02-10296	19	K	0.1017 ± 0.0208	0.0920 ± 0.0058	0.1031 ± 0.0061	0.1002 ± 0.0007	0.0912 ± 0.0105	0.1002
TF02-10296	20	Ca	0.1799 ± 0.0313	0.1403 ± 0.0081	0.1368 ± 0.0055	0.1568 ± 0.0009	0.1534 ± 0.0174	0.1534
TF02-10296	21	Sc	not reported	0.0025 ± 0.0018	0 ± 0.0000	0 ± 0.0002	0 ± 0.0015	-----
TF02-10296	22	Ti	< 0.0038	0.0127 ± 0.0032	0.0128 ± 0.0019	0.0080 ± 0.0002	0.0212 ± 0.0014	-----
TF02-10296	23	V	< 0.0028	-0.0017 ± 0.0011	0 ± 0.0000	0.0010 ± 0.0002	0.0014 ± 0.0007	-----
TF02-10296	24	Cr	< 0.0021	0.0016 ± 0.0011	0.0069 ± 0.0007	0.0020 ± 0.0002	0.0026 ± 0.0007	-----
TF02-10296	25	Mn	0.0099 ± 0.0011	0.0137 ± 0.0024	0.0035 ± 0.0009	0.0071 ± 0.0002	0.0085 ± 0.0011	0.0085
TF02-10296	26	Fe	0.2804 ± 0.0141	0.3018 ± 0.0224	0.2873 ± 0.0031	0.2645 ± 0.0054	0.3074 ± 0.0156	0.2873
TF02-10296	27	Co	< 0.0050	-0.0051 ± 0.0020	0 ± 0.0000	0 ± 0.0004	0 ± 0.0019	-----
TF02-10296	28	Ni	0.0009 ± 0.0015	0.0018 ± 0.0013	0.0029 ± 0.0005	0.0024 ± 0.0002	0.0003 ± 0.0005	-----
TF02-10296	29	Cu	0.0039 ± 0.0007	0.0080 ± 0.0018	0.0105 ± 0.0009	0.0080 ± 0.0002	0.0069 ± 0.0008	0.0080
TF02-10296	30	Zn	0.0437 ± 0.0023	0.0274 ± 0.0042	0.0411 ± 0.0012	0.0310 ± 0.0003	0.0392 ± 0.0022	0.0392
TF02-10296	31	Ga	not reported	-0.0114 ± 0.0027	0.0008 ± 0.0016	0 ± 0.0002	0.0018 ± 0.0013	-----
TF02-10296	33	As	0.0058 ± 0.0016	-0.0037 ± 0.0033	0.0100 ± 0.0015	0.0012 ± 0.0003	0.0028 ± 0.0011	-----
TF02-10296	34	Se	< 0.0015	0.0055 ± 0.0019	0.0021 ± 0.0012	0 ± 0.0001	0.0003 ± 0.0009	-----
TF02-10296	35	Br	0.0029 ± 0.0007	0.0027 ± 0.0021	0.0020 ± 0.0011	0.0028 ± 0.0001	0.0009 ± 0.0009	-----
TF02-10296	37	Rb	< 0.0013	0.0066 ± 0.0022	0.0014 ± 0.0011	0 ± 0.0001	0 ± 0.0009	-----
TF02-10296	38	Sr	< 0.0014	-0.0050 ± 0.0060	0.0065 ± 0.0016	0 ± 0.0002	0.0005 ± 0.0010	-----
TF02-10296	39	Y	< 0.0016	-0.0041 ± 0.0060	0.0070 ± 0.0019	0 ± 0.0002	0 ± 0.0012	-----
TF02-10296	40	Zr	0.0046 ± 0.0010	0.0043 ± 0.0054	0 ± 0.0000	0 ± 0.0002	0.0031 ± 0.0015	-----
TF02-10296	41	Nb	not reported	0.0168 ± 0.0064	0.0093 ± 0.0029	0 ± 0.0003	0 ± 0.0017	-----
TF02-10296	42	Mo	< 0.0029	0.0089 ± 0.0063	0.0009 ± 0.0024	0 ± 0.0003	0.0044 ± 0.0019	-----
TF02-10296	47	Ag	not reported	0.0070 ± 0.0228	0.0064 ± 0.0024	0 ± 0.0008	0.0028 ± 0.0038	-----
TF02-10296	48	Cd	not reported	-0.0152 ± 0.0066	0.0132 ± 0.0029	0 ± 0.0009	0 ± 0.0038	-----
TF02-10296	49	In	not reported	not reported	0 ± 0.0000	0 ± 0.0010	0.0019 ± 0.0041	-----
TF02-10296	50	Sn	0.0093 ± 0.0120	0.0080 ± 0.0051	0.0001 ± 0.0057	0.0229 ± 0.0013	0.0156 ± 0.0069	-----
TF02-10296	51	Sb	0.0139 ± 0.0143	0.0089 ± 0.0062	0.0595 ± 0.0086	0.0019 ± 0.0022	0.0007 ± 0.0054	-----

Sample ID	Z	Element	CARB ( $\mu\text{g}/\text{cm}^2$ )	EPA ( $\mu\text{g}/\text{cm}^2$ )	STN Lab 1 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab2 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab3 ( $\mu\text{g}/\text{cm}^2$ )	Median* ( $\mu\text{g}/\text{cm}^2$ )
TF02-10296	55	Cs	not reported	$-0.0061 \pm 0.0034$	$0 \pm 0.0000$	$0 \pm 0.0008$	$0 \pm 0.0144$	-----
TF02-10296	56	Ba	$< 0.0290$	$0.0050 \pm 0.0065$	$0 \pm 0.0000$	$0.0210 \pm 0.0015$	$0.0449 \pm 0.0201$	-----
TF02-10296	57	La	not reported	$0.0032 \pm 0.0045$	$0 \pm 0.0000$	$0.0060 \pm 0.0011$	$0 \pm 0.0269$	-----
TF02-10296	58	Ce	not reported	$0.0048 \pm 0.0035$	$0 \pm 0.0000$	$0.0060 \pm 0.0010$	$0 \pm 0.0334$	-----
TF02-10296	62	Sm	not reported	not reported	$0.0165 \pm 0.0016$	$0 \pm 0.0005$	$0 \pm 0.0025$	-----
TF02-10296	63	Eu	not reported	not reported	$0.0345 \pm 0.0020$	$0 \pm 0.0007$	$0 \pm 0.0057$	-----
TF02-10296	65	Tb	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0009$	$0 \pm 0.0123$	-----
TF02-10296	72	Hf	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0113$	-----
TF02-10296	73	Ta	not reported	not reported	$0.0023 \pm 0.0022$	$0 \pm 0.0006$	$0.0076 \pm 0.0084$	-----
TF02-10296	74	W	not reported	$-0.0095 \pm 0.0068$	$0.0294 \pm 0.0060$	$0 \pm 0.0009$	$0 \pm 0.0063$	-----
TF02-10296	77	Ir	not reported	not reported	$0.0001 \pm 0.0000$	$0 \pm 0.0001$	$0.0036 \pm 0.0027$	-----
TF02-10296	79	Au	not reported	$-0.0074 \pm 0.0041$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0022$	-----
TF02-10296	80	Hg	$< 0.0032$	$-0.0065 \pm 0.0043$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0019$	-----
TF02-10296	82	Pb	$< 0.0043$	$0.0183 \pm 0.0065$	$0.0021 \pm 0.0033$	$0.0108 \pm 0.0002$	$0.0040 \pm 0.0025$	-----

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

**Table 11. XRF Data - Blank Filters**

Sample ID	Z	Element	CARB ( $\mu\text{g}/\text{cm}^2$ )	EPA ( $\mu\text{g}/\text{cm}^2$ )	STN Lab 1 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab2 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab3 ( $\mu\text{g}/\text{cm}^2$ )
TF02-10287	11	Na	not reported	$-0.0124 \pm 0.0106$	$0.1377 \pm 0.0163$	$0 \pm 0.0044$	$0.1705 \pm 0.0512$
TF02-10287	12	Mg	not reported	$-0.0136 \pm 0.0096$	$0.0484 \pm 0.0047$	$0 \pm 0.0008$	$0 \pm 0.0138$
TF02-10287	13	Al	$< 0.0047$	$-0.0449 \pm 0.0167$	$0.0350 \pm 0.0058$	$0 \pm 0.0003$	$0.0161 \pm 0.0063$
TF02-10287	14	Si	$< 0.0026$	$-0.0537 \pm 0.0193$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0.0016 \pm 0.0029$
TF02-10287	15	P	$< 0.0017$	$-0.0083 \pm 0.0103$	$0 \pm 0.0000$	$0 \pm 0.0001$	$0.0017 \pm 0.0023$
TF02-10287	16	S	$0.0082 \pm 0.0016$	$-0.0136 \pm 0.0083$	$0.0098 \pm 0.0024$	$0 \pm 0.0001$	$0.0062 \pm 0.0028$
TF02-10287	17	Cl	$< 0.0061$	$0.0229 \pm 0.0062$	$0.0009 \pm 0.0020$	$0 \pm 0.0002$	$0 \pm 0.0039$
TF02-10287	19	K	$< 0.0094$	$-0.0016 \pm 0.0018$	$0.0003 \pm 0.0032$	$0 \pm 0.0002$	$0 \pm 0.0013$
TF02-10287	20	Ca	$< 0.0150$	$0.0027 \pm 0.0017$	$0.0054 \pm 0.0024$	$0 \pm 0.0002$	$0.0045 \pm 0.0013$
TF02-10287	21	Sc	not reported	$0.0001 \pm 0.0013$	$0 \pm 0.0000$	$0 \pm 0.0001$	$0.0008 \pm 0.0009$
TF02-10287	22	Ti	$< 0.0038$	$0.0071 \pm 0.0027$	$0.0009 \pm 0.0014$	$0 \pm 0.0001$	$0.0037 \pm 0.0011$
TF02-10287	23	V	$< 0.0028$	$-0.0018 \pm 0.0010$	$0 \pm 0.0000$	$0 \pm 0.0001$	$0.0005 \pm 0.0006$
TF02-10287	24	Cr	$< 0.0021$	$0.0019 \pm 0.0010$	$0.0020 \pm 0.0006$	$0 \pm 0.0001$	$0.0007 \pm 0.0006$
TF02-10287	25	Mn	$< 0.0016$	$0.0013 \pm 0.0015$	$0.0013 \pm 0.0005$	$0 \pm 0.0001$	$0.0010 \pm 0.0009$
TF02-10287	26	Fe	$< 0.0013$	$0.0017 \pm 0.0014$	$0.0069 \pm 0.0006$	$0 \pm 0.0001$	$0.0022 \pm 0.0007$
TF02-10287	27	Co	$< 0.0050$	$0.0008 \pm 0.0013$	$0 \pm 0.0000$	$0 \pm 0.0001$	$0 \pm 0.0005$
TF02-10287	28	Ni	$< 0.0009$	$0.0008 \pm 0.0012$	$0.0015 \pm 0.0005$	$0 \pm 0.0001$	$0 \pm 0.0005$
TF02-10287	29	Cu	$< 0.0013$	$0.0029 \pm 0.0014$	$0.0059 \pm 0.0007$	$0 \pm 0.0001$	$0 \pm 0.0006$
TF02-10287	30	Zn	$< 0.0011$	$-0.0070 \pm 0.0023$	$0.0016 \pm 0.0008$	$0 \pm 0.0001$	$0 \pm 0.0006$
TF02-10287	31	Ga	not reported	$-0.0172 \pm 0.0026$	$0.0009 \pm 0.0006$	$0 \pm 0.0000$	$0.0044 \pm 0.0012$
TF02-10287	33	As	$< 0.0018$	$-0.0061 \pm 0.0028$	$0.0008 \pm 0.0004$	$0 \pm 0.0000$	$0 \pm 0.0009$
TF02-10287	34	Se	$< 0.0015$	$0.0041 \pm 0.0019$	$0 \pm 0.0000$	$0 \pm 0.0001$	$0 \pm 0.0008$
TF02-10287	35	Br	$< 0.0012$	$-0.0046 \pm 0.0020$	$0 \pm 0.0000$	$0 \pm 0.0001$	$0 \pm 0.0008$
TF02-10287	37	Rb	$< 0.0013$	$0.0052 \pm 0.0021$	$0 \pm 0.0000$	$0 \pm 0.0001$	$0 \pm 0.0008$
TF02-10287	38	Sr	$0.0017 \pm 0.0022$	$-0.0060 \pm 0.0051$	$0.0001 \pm 0.0005$	$0 \pm 0.0001$	$0 \pm 0.0010$
TF02-10287	39	Y	$0.0030 \pm 0.0009$	$0.0065 \pm 0.0060$	$0.0010 \pm 0.0006$	$0 \pm 0.0001$	$0 \pm 0.0012$
TF02-10287	40	Zr	$0.0025 \pm 0.0029$	$-0.0023 \pm 0.0052$	$0 \pm 0.0000$	$0 \pm 0.0001$	$0 \pm 0.0014$
TF02-10287	41	Nb	not reported	$0.0136 \pm 0.0063$	$0 \pm 0.0000$	$0 \pm 0.0001$	$0 \pm 0.0016$
TF02-10287	42	Mo	$< 0.0029$	$0.0035 \pm 0.0058$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0.0009 \pm 0.0018$



Sample ID	Z	Element	CARB ( $\mu\text{g}/\text{cm}^2$ )	EPA ( $\mu\text{g}/\text{cm}^2$ )	STN Lab 1 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab2 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab3 ( $\mu\text{g}/\text{cm}^2$ )
TF02-10287	47	Ag	not reported	$-0.0254 \pm 0.0186$	$0.0025 \pm 0.0024$	$0 \pm 0.0003$	$0.0061 \pm 0.0037$
TF02-10287	48	Cd	not reported	$-0.0014 \pm 0.0060$	$0.0016 \pm 0.0031$	$0 \pm 0.0003$	$0 \pm 0.0037$
TF02-10287	49	In	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0004$	$0.0021 \pm 0.0041$
TF02-10287	50	Sn	$< 0.0078$	$-0.0009 \pm 0.0035$	$0 \pm 0.0000$	$0 \pm 0.0005$	$0.0144 \pm 0.0068$
TF02-10287	51	Sb	$< 0.0091$	$0.0025 \pm 0.0037$	$0.0037 \pm 0.0080$	$0 \pm 0.0007$	$0 \pm 0.0052$
TF02-10287	55	Cs	not reported	$-0.0035 \pm 0.0029$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0137$
TF02-10287	56	Ba	$< 0.0290$	$-0.0101 \pm 0.0055$	$0.0188 \pm 0.0030$	$0 \pm 0.0018$	$0.0742 \pm 0.0277$
TF02-10287	57	La	not reported	$0.0080 \pm 0.0041$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0.0128 \pm 0.0260$
TF02-10287	58	Ce	not reported	$0.0044 \pm 0.0029$	$0 \pm 0.0000$	$0 \pm 0.0003$	$0.0288 \pm 0.0322$
TF02-10287	62	Sm	not reported	not reported	$0.0058 \pm 0.0014$	$0 \pm 0.0003$	$0 \pm 0.0023$
TF02-10287	63	Eu	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0042$
TF02-10287	65	Tb	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0029$
TF02-10287	72	Hf	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0002$	$0.0121 \pm 0.0104$
TF02-10287	73	Ta	not reported	not reported	$0.0010 \pm 0.0008$	$0 \pm 0.0001$	$0.0317 \pm 0.0110$
TF02-10287	74	W	not reported	$-0.0009 \pm 0.0062$	$0.0026 \pm 0.0017$	$0 \pm 0.0001$	$0 \pm 0.0054$
TF02-10287	77	Ir	not reported	not reported	$0.0000 \pm 0.0000$	$0 \pm 0.0001$	$0.0092 \pm 0.0035$
TF02-10287	79	Au	not reported	$-0.0068 \pm 0.0040$	$0.0014 \pm 0.0011$	$0 \pm 0.0001$	$0.0022 \pm 0.0020$
TF02-10287	80	Hg	$< 0.0032$	$0.0047 \pm 0.0043$	$0.0023 \pm 0.0014$	$0 \pm 0.0001$	$0.0012 \pm 0.0017$
TF02-10287	82	Pb	$< 0.0043$	$0.0056 \pm 0.0057$	$0.0007 \pm 0.0009$	$0 \pm 0.0001$	$0.0040 \pm 0.0023$
TF02-10290	11	Na	not reported	$-0.0226 \pm 0.0105$	$0 \pm 0.0000$	$0 \pm 0.0044$	$0.0463 \pm 0.0241$
TF02-10290	12	Mg	not reported	$-0.0081 \pm 0.0106$	$0 \pm 0.0000$	$0 \pm 0.0008$	$0 \pm 0.0080$
TF02-10290	13	Al	$< 0.0047$	$-0.0036 \pm 0.0170$	$0 \pm 0.0000$	$0 \pm 0.0003$	$0 \pm 0.0042$
TF02-10290	14	Si	$0.0063 \pm 0.0024$	$-0.0330 \pm 0.0184$	$0.0184 \pm 0.0051$	$0 \pm 0.0002$	$0.0096 \pm 0.0032$
TF02-10290	15	P	$< 0.0017$	$-0.0256 \pm 0.0100$	$0.0288 \pm 0.0020$	$0 \pm 0.0001$	$0 \pm 0.0023$
TF02-10290	16	S	$0.0129 \pm 0.0016$	$0.0052 \pm 0.0083$	$0.0148 \pm 0.0025$	$0 \pm 0.0001$	$0.0114 \pm 0.0031$
TF02-10290	17	Cl	$0.0091 \pm 0.0040$	$0.0290 \pm 0.0064$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0036$
TF02-10290	19	K	$< 0.0094$	$0.0020 \pm 0.0018$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0013$
TF02-10290	20	Ca	$< 0.0150$	$0.0180 \pm 0.0022$	$0.0086 \pm 0.0023$	$0 \pm 0.0002$	$0.0253 \pm 0.0031$
TF02-10290	21	Sc	not reported	$-0.0031 \pm 0.0013$	$0 \pm 0.0000$	$0 \pm 0.0001$	$0.0013 \pm 0.0009$
TF02-10290	22	Ti	$< 0.0038$	$0.0076 \pm 0.0026$	$0.0050 \pm 0.0014$	$0 \pm 0.0001$	$0.0032 \pm 0.0010$
TF02-10290	23	V	$< 0.0028$	$-0.0007 \pm 0.0010$	$0.0024 \pm 0.0010$	$0 \pm 0.0001$	$0.0002 \pm 0.0006$

Sample ID	Z	Element	CARB ( $\mu\text{g}/\text{cm}^2$ )	EPA ( $\mu\text{g}/\text{cm}^2$ )	STN Lab 1 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab2 ( $\mu\text{g}/\text{cm}^2$ )	STN Lab3 ( $\mu\text{g}/\text{cm}^2$ )
TF02-10290	24	Cr	< 0.0021	$0.0019 \pm 0.0010$	$0.0013 \pm 0.0006$	$0 \pm 0.0001$	$0.0004 \pm 0.0006$
TF02-10290	25	Mn	< 0.0016	$-0.0017 \pm 0.0014$	$0 \pm 0.0000$	$0 \pm 0.0001$	$0.0021 \pm 0.0008$
TF02-10290	26	Fe	< 0.0013	$-0.0006 \pm 0.0014$	$0.0065 \pm 0.0006$	$0 \pm 0.0001$	$0.0039 \pm 0.0007$
TF02-10290	27	Co	< 0.0050	$0.0025 \pm 0.0014$	$0.0003 \pm 0.0004$	$0 \pm 0.0001$	$0.0006 \pm 0.0005$
TF02-10290	28	Ni	< 0.0009	$-0.0014 \pm 0.0011$	$0.0007 \pm 0.0004$	$0 \pm 0.0001$	$0.0007 \pm 0.0005$
TF02-10290	29	Cu	< 0.0013	$0.0019 \pm 0.0013$	$0.0064 \pm 0.0007$	$0 \pm 0.0000$	$0.0007 \pm 0.0006$
TF02-10290	30	Zn	< 0.0011	$-0.0051 \pm 0.0021$	$0.0022 \pm 0.0008$	$0 \pm 0.0001$	$0 \pm 0.0006$
TF02-10290	31	Ga	not reported	$-0.0082 \pm 0.0025$	$0.0004 \pm 0.0006$	$0 \pm 0.0000$	$0.0008 \pm 0.0013$
TF02-10290	33	As	< 0.0018	$-0.0050 \pm 0.0027$	$0.0014 \pm 0.0004$	$0 \pm 0.0000$	$0 \pm 0.0009$
TF02-10290	34	Se	< 0.0015	$0.0002 \pm 0.0016$	$0.0004 \pm 0.0004$	$0 \pm 0.0001$	$0.0004 \pm 0.0008$
TF02-10290	35	Br	< 0.0012	$0.0012 \pm 0.0020$	$0 \pm 0.0000$	$0 \pm 0.0001$	$0 \pm 0.0007$
TF02-10290	37	Rb	< 0.0013	$0.0062 \pm 0.0020$	$0.0001 \pm 0.0004$	$0 \pm 0.0001$	$0 \pm 0.0008$
TF02-10290	38	Sr	$0.0018 \pm 0.0021$	$0.0003 \pm 0.0052$	$0.0007 \pm 0.0005$	$0 \pm 0.0001$	$0 \pm 0.0010$
TF02-10290	39	Y	< 0.0016	$0.0060 \pm 0.0060$	$0 \pm 0.0000$	$0 \pm 0.0001$	$0 \pm 0.0012$
TF02-10290	40	Zr	< 0.0018	$-0.0041 \pm 0.0049$	$0 \pm 0.0000$	$0 \pm 0.0001$	$0 \pm 0.0014$
TF02-10290	41	Nb	not reported	$0.0011 \pm 0.0055$	$0.0009 \pm 0.0010$	$0 \pm 0.0001$	$0.0021 \pm 0.0016$
TF02-10290	42	Mo	< 0.0029	$0.0109 \pm 0.0060$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0.0013 \pm 0.0018$
TF02-10290	47	Ag	not reported	$0.0178 \pm 0.0198$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0.0025 \pm 0.0037$
TF02-10290	48	Cd	not reported	$-0.0110 \pm 0.0056$	$0 \pm 0.0000$	$0 \pm 0.0003$	$0 \pm 0.0037$
TF02-10290	49	In	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0004$	$0 \pm 0.0039$
TF02-10290	50	Sn	< 0.0078	$0.0055 \pm 0.0036$	$0 \pm 0.0000$	$0 \pm 0.0005$	$0.0202 \pm 0.0069$
TF02-10290	51	Sb	< 0.0091	$0.0014 \pm 0.0040$	$0.0030 \pm 0.0081$	$0 \pm 0.0007$	$0.0008 \pm 0.0054$
TF02-10290	55	Cs	not reported	$-0.0043 \pm 0.0028$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0138$
TF02-10290	56	Ba	< 0.0290	$-0.0035 \pm 0.0053$	$0 \pm 0.0000$	$0 \pm 0.0003$	$0.0508 \pm 0.0196$
TF02-10290	57	La	not reported	$0.0149 \pm 0.0042$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0261$
TF02-10290	58	Ce	not reported	$-0.0011 \pm 0.0028$	$0 \pm 0.0000$	$0 \pm 0.0002$	$0.0154 \pm 0.0323$
TF02-10290	62	Sm	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0003$	$0 \pm 0.0022$
TF02-10290	63	Eu	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0040$
TF02-10290	65	Tb	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0002$	$0 \pm 0.0028$
TF02-10290	72	Hf	not reported	not reported	$0 \pm 0.0000$	$0 \pm 0.0002$	$0.0186 \pm 0.0103$
TF02-10290	73	Ta	not reported	not reported	$0.0025 \pm 0.0008$	$0 \pm 0.0001$	$0.0071 \pm 0.0080$

<b>Sample ID</b>	<b>Z</b>	<b>Element</b>	<b>CARB (<math>\mu\text{g}/\text{cm}^2</math>)</b>	<b>EPA (<math>\mu\text{g}/\text{cm}^2</math>)</b>	<b>STN Lab 1 (<math>\mu\text{g}/\text{cm}^2</math>)</b>	<b>STN Lab2 (<math>\mu\text{g}/\text{cm}^2</math>)</b>	<b>STN Lab3 (<math>\mu\text{g}/\text{cm}^2</math>)</b>
TF02-10290	74	W	not reported	$-0.0113 \pm 0.0059$	$0.0074 \pm 0.0017$	$0 \pm 0.0001$	$0 \pm 0.0053$
TF02-10290	77	Ir	not reported	not reported	$0.0001 \pm 0.0000$	$0 \pm 0.0001$	$0 \pm 0.0025$
TF02-10290	79	Au	not reported	$-0.0002 \pm 0.0037$	$0 \pm 0.0000$	$0 \pm 0.0001$	$0.0036 \pm 0.0019$
TF02-10290	80	Hg	$< 0.0032$	$-0.0001 \pm 0.0041$	$0 \pm 0.0000$	$0 \pm 0.0001$	$0.0017 \pm 0.0018$
TF02-10290	82	Pb	$< 0.0043$	$0.0089 \pm 0.0054$	$0 \pm 0.0000$	$0 \pm 0.0001$	$0.0033 \pm 0.0023$