Appendix D

Laboratory Analysis of PM_{10} Filters

Texas Air Control Board

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INTEROFFICE

FROM J. Maxine Jenks, Ph.D., Director, Sampling and Analysis Division TO Joe Panketh, Control Strategy Division

SUBJECT Evaluation of PM_{10} Filters

Attached are the results of the microscopy analyses of the PM_{10} filters from the El Paso Health Department site (SAROAD number 1700002F01). The filters were examined by optical and scanning electron microscopy. In addition, X-ray microanalysis was performed. Also attached is a description of the methodologies used for these analyses.

If you have any questions concerning these analyses, please contact Scott Mgebroff.

Attachments

CC: Mr. Bruce Broberg, Control Strategy Division

Signed J. Maxine Jenks

Date October 29, 1987

Methodology

Optical Microscopy

Particulate was removed from each filter for examination by rolling a dissecting needle coated with a thin layer of chilled Aroclor 1260 mounting media across the filter surface. The mounting media with the particulate embedded in it was then transferred to a microscope slide and covered with a cover slip. The slide was then heated briefly on a hotplate in order to disperse the mounting media and particulate.

The particulate was examined using polarized light microscopy at X100, X200, and X400 magnifications. A Porton reticle was used to measure particle sizes. Relative volumes were estimated by using a point counting array. Particle types were identified by morphology, color, pleochroism, crystal habit, and birefringence.

Using these techniques, the percent volume, largest particle and the particle size range of each particle type of interest were determined. The particle size range was defined to include only those particles which made up most of the volume of the particular particle type. The actual aerodynamic particle sizes could not be determined.

While removing particulate from the filter, the color and amount of particulate loading of the filter were also noted.

Scanning Electron Microscopy and X-Ray Microanalysis

A section of each filter, approximately 1 x 2 cm, was mounted on an aluminum stub and coated with a thin layer of gold/palladium using a vacuum evaporator. An area X-ray spectrum was then collected for 200 seconds at X100 magnification. An automated routine using area counts was then performed to estimate the relative amounts of each element ($Z \geq 11$) detected. The relative amounts were calculated as a percent of the calcium detected. Silicon could not be determined because of the high, variable background levels present in the filter media.

Individual particles on each filter were then examined manually at higher magnification in order to determine what compounds containing heavy metals ($Z \geq 24$) were present. When only one element was found it was assumed to be either the metal or oxide form.

01/10/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (µ)	MOST (µ)
Calcium Carbonate	30	15	2 - 10
Quartz/Mixed Clay	50	20	2 - 10
Carbon Soot	1 - 5	30*	<1
Carbonaceous Flakes	15	25	5 - 10
Tire Rubber Dust	1 - 5	20	2 - 10
Fungal Spores/Pollens	<1	---	---
Iron Oxides	<1	---	---

* Aggregate

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
Al	2.4	PbBrCl
S	14.3	As/oxides
Cl	1.2	CuS
K	10.7	CuFeS
Ca	100.0	
Fe	9.3	
Cu	1.2	
As	0.8	
Pb	Trace	
Br	Trace	
Cr	0.7	

FILTER

Color -- grey-black
Loading -- heavy

Most Volume -- 2 - 10µ
Particles >10µ -- few

PM_{10} -- 161 ug/m^3

01/11/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (μ)	MOST (μ)
Calcium Carbonate	40	20	2 - 10
Quartz/Mixed Clay	35	30	5 - 10
Carbon Soot	10	40*	<1
Carbonaceous Flakes	1 - 5	20	2 - 10
Tire Rubber Dust	10	20	5 - 10
Fungal Spores/Pollens	<1	---	---
Iron Oxides	<1	---	---

* Aggregate

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
Al	2.0	Cu/oxides
S	12.6	Pb/oxides
Cl	3.2	CuS
K	9.0	PbBrCl
Ca	100.0	PbCl
Cr	0.9	ZnS
Fe	8.5	CuFeS
Cu	1.3	
Pb	0.7	
Ti	Trace	
Zn	Trace	

FILTER

Color -- grey-black
Loading -- heavy

Most Volume -- 5 - 10μ
Particles >10μ -- moderate

PM_{10} -- 164 ug/m^3

01/14/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (μ)	MOST (μ)
Calcium Carbonate	60	20	2 - 10
Quartz/Mixed Clay	20	15	5 - 10
Carbon Soot	1 - 5	10*	<1
Carbonaceous Flakes	15	20	5 - 10
Tire Rubber Dust	5	20	5 - 10
Fungal Spores/Pollens	<1	---	---
Iron Oxides	<1	---	---

* Aggregate

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
Al	1.2	PbCl
S	7.8	PbBCl
Cl	3.4	CuS
K	9.0	ZnS
Ca	100.0	
Fe	8.1	
Cu	1.2	
Ti	Trace	
Pb	Trace	
Zn	Trace	

FILTER

Color -- grey-brown
Loading -- heavy

Most Volume -- 5 - 10μ
Particles >10μ -- moderate

PM_{10} -- 195 ug/m^3

01/20/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (μ)	MOST (μ)
Calcium Carbonate	70	40	5 - 10
Quartz/Mixed Clay	15	15	2 - 10
Carbon Soot	1 - 5	10*	<1
Carbonaceous Flakes	10	30	2 - 10
Tire Rubber Dust	1 - 5	30	2 - 10
Fungal Spores/Pollens	<1	---	---
Iron Oxides	<1	---	---

* Aggregate

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
Al	1.3	Cu/oxides
S	8.4	Pb/oxides
Cl	1.1	CuS
K	6.6	PbCl
Ca	100.0	PbBrCl
Fe	8.2	FeCuS
Cu	1.2	
Pb	Trace	
Br	Trace	

FILTER

Color -- grey-brown
Loading -- heavy

Most Volume -- 2 - 10μ
Particles >10μ -- few

PM_{10} -- 140 ug/m^3

01/23/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (μ)	MOST (μ)
Calcium Carbonate	75	15	2 - 10
Quartz/Mixed Clay	15	25	2 - 10
Carbon Soot	1 - 5	5*	2 - 10
Carbonaceous Flakes	10	20	<1
Tire Rubber Dust	<1	20	5 - 10
Fungal Spores/Pollens	<1	---	2 - 10
Iron Oxides	<1	---	---

* Aggregate

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
Al	1.8	Pb/oxides
S	9.9	CuS
Cl	1.6	PbBrCl
K	7.6	FeS
Ca	100.0	FeCuS
Fe	8.0	
Cr	Trace	
Cu	Trace	
Pb	Trace	

FILTER

Color -- grey-black
Loading -- heavy

Most Volume -- 2 - 10μ
Particles >10μ -- moderate

PM_{10} -- 135 ug/m^3

01/30/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (μ)	MOST (μ)
Calcium Carbonate	45	10	2 - 10
Quartz/Mixed Clay	50	10	5 - 10
Carbon Soot	1 - 5	10*	<1
Carbonaceous Flakes	1 - 5	30	2 - 10
Tire Rubber Dust	<1	20	5 - 10
Fungal Spores/Pollens	<1	---	---
Iron Oxides	<1	---	---

* Aggregate

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
Al	6.2	FeCuS
S	5.2	CuS
Cl	2.7	PbBrCl
K	11.2	
Ca	100.0	
Ti	1.5	
Mg	0.3	
Fe	11.2	
Cu	0.8	
Pb	Trace	
Br	Trace	

FILTER

Color -- grey-brown
Loading -- heavy

Most Volume -- 5 - 10μ
Particles >10μ -- few

PM_{10} -- 324 ug/m^3

02/01/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (μ)	MOST (μ)
Calcium Carbonate	35	15	2 - 5
Quartz/Mixed Clay	10	30	5 - 10
Carbon Soot	1 - 5	15*	<1
Carbonaceous Flakes	50	20	5 - 10
Tire Rubber Dust	1 - 5	15	5 - 10
Fungal Spores/Pollens	<1	---	---
Iron Oxides	<1	---	---

* Aggregate

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
Al	Trace	FeCuS
S	22.8	PbBrCl
K	10.4	Pb/oxides
Ca	100.0	CuS
Fe	11.2	
Ti	Trace	
Cr	Trace	
Cu	Trace	
Pb	Trace	

FILTER

Color -- grey-brown
Loading -- moderate

Most Volume -- 5 - 10μ
Particles >10μ -- many

PM_{10} -- 48 ug/m^3

03/06/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (μ)	MOST (μ)
Calcium Carbonate	50	25	2 - 10
Quartz/Mixed Clay	45	30	2 - 5
Carbon Soot	1 - 5	15*	<1
Carbonaceous Flakes	1 - 5	25	5 - 10
Tire Rubber Dust	<1	40	5 - 10
Fungal Spores/Pollens	<1	---	---
Iron Oxides	<1	---	---

* Aggregate

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
Al	11.2	PbBrCl
S	7.0	PbCl
K	15.6	Pb/oxides
Ca	100.0	
Fe	16.0	
Ti	1.7	

FILTER

Color -- grey-brown
Loading -- heavy

Most Volume -- 2 - 10μ
Particles >10μ -- moderate

PM_{10} -- 165 ug/m^3
(Dust Storm)

03/09/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (μ)	MOST (μ)
Calcium Carbonate	45	30	10 - 20
Quartz/Mixed Clay	50	60	10 - 20
Carbon Soot	<1	<1	<1
Carbonaceous Flakes	<1	30	10 - 20
Tire Rubber Dust	<1	30	2 - 10
Fungal Spores/Pollens	<1	---	---
Iron Oxides	<1	---	---

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
Al	4.7	Pb/oxides
S	5.2	FeCuS
K	8.0	CuPbS
Ca	100.0	PbCuFe
Fe	9.5	ZnS
Cl	0.9	FeS
Cu	1.0	Cu/oxides
Mg	0.5	PbBrCl
		Mn/oxides
		PbFe

FILTER

Color -- light brown
Loading -- moderate

Most Volume -- 10 - 20μ
Particles >10μ -- many

PM_{10} -- 240 ug/m^3
(Dust Storm)

04/02/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (µ)	MOST (µ)
Calcium Carbonate	60	30	5 - 10
Quartz/Mixed Clay	35	40	5 - 10
Carbon Soot	<1	<1	<1
Carbonaceous Flakes	<1	10	5 - 10
Tire Rubber Dust	<1	80	10 - 20
Fungal Spores/Pollens	<1	---	---
Iron Oxides	<1	---	---

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
Al	5.8	Pb/oxides
K	12.3	CuS
Ca	100.0	FeCuS
Fe	13.4	ZnS
Ti	1.9	PbCuZnMnFe
Na	0.5	ZnFe
Cu	1.8	FeTi
Mg	0.6	ZnFeS

FILTER

Color -- light brown
Loading -- moderate

Most Volume -- 5 - 10µ
Particles >10µ -- many

PM_{10} -- 204 ug/m^3
(Dust Storm)

04/05/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (μ)	MOST (μ)
Calcium Carbonate	60	30	5 - 10
Quartz/Mixed Clay	30	15	2 - 10
Carbon Soot	1 - 5	10*	<1
Carbonaceous Flakes	1 - 5	15	2 - 10
Tire Rubber Dust	<1	30	2 - 10
Fungal Spores/Pollens	<1	---	---
Iron Oxides	<1	---	---

* Aggregate

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
Al	4.5	FeCuAsS
S	6.3	CuS
Cl	3.2	PbBrCl
K	8.2	AsCuFe
Ca	100.0	PbCl
Fe	9.6	Pb/oxides
Mg	0.3	

FILTER

Color -- grey-black
Loading -- heavy

Most Volume -- 2 - 10μ
Particles >10μ -- few

PM_{10} -- 154 ug/m^3

04/13/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (μ)	MOST (μ)
Calcium Carbonate	30	40	10 - 20
Quartz/Mixed Clay	55	30	10 - 20
Carbon Soot	<1	10*	2 - 5*
Carbonaceous Flakes	10	50	10 - 20
Tire Rubber Dust	<1	20	5 - 10
Fungal Spores/Pollens	1 - 5	---	---
Iron Oxides	<1	---	---

* Aggregates: filter also has a significant amount of burned vegetation on it.

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
Al	2.6	FeCuS
K	8.7	Pb/oxides
Ca	100.0	Cu/oxides
Fe	10.0	FeCuZnPb
Ti	1.7	PbBrCl
Cr	1.3	

FILTER

Color -- light brown
Loading -- moderate

Most Volume -- 10 - 20μ
Particles >10μ -- many

PM_{10} -- 123 ug/m^3
(Dust Storm)

04/17/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (μ)	MOST (μ)
Calcium Carbonate	40	40	5 - 10
Quartz/Mixed Clay	55	40	5 - 10
Carbon Soot	<1	10	<1
Carbonaceous Flakes	1 - 5	50	5 - 10
Tire Rubber Dust	<1	30	5 - 10
Fungal Spores/Pollens	<1	---	---
Iron Oxides	<1	---	---

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
Al	4.7	FeCuAsS
S	6.1	FeCuS
K	10.4	FeCuZnPb
Ca	100.0	ZnS
Fe	10.5	PbBrCl
Ti	1.9	
Mg	0.7	

FILTER

Color -- brown-grey
Loading -- moderate

Most Volume -- 5 - 10μ
Particles >10μ -- moderate

PM_{10} -- 136 ug/m^3
(Dust Storm)

05/24/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (μ)	MOST (μ)
Calcium Carbonate	40	30	5 - 10
Quartz/Mixed Clay	50	20	2 - 10
Carbon Soot	1 - 5	10*	<1
Carbonaceous Flakes	5	30	2 - 10
Tire Rubber Dust	1 - 5	25	2 - 10
Fungal Spores/Pollens	<1	---	---
Iron Oxides	<1	---	---

* Aggregate

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
Al	3.9	FeCuS
S	10.0	PbBrCl
K	8.8	PbCl
Ca	100.0	Pb/oxides
Fe	8.7	CuS
Ti	1.2	
Cu	Trace	
Mg	0.4	

FILTER

Color -- grey-brown
Loading -- heavy

Most Volume -- 2 - 10μ
Particles >10μ -- few

PM_{10} -- 128 ug/m^3

06/14/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (μ)	MOST (μ)
Calcium Carbonate	60	40	2 - 10
Quartz/Mixed Clay	30	40	2 - 10
Carbon Soot	<1	5*	<1
Carbonaceous Flakes	5	30	10 - 20
Tire Rubber Dust	1 - 5	40	2 - 10
Fungal Spores/Pollens	<1	---	---
Iron Oxides	<1	---	---

* Aggregate

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
Al	1.0	PbBrCl
S	14.7	FeCuS
K	11.9	Pb/oxides
Ca	100.0	PbFe
Fe	12.7	
Cu	Trace	

FILTER

Color -- grey-brown
Loading -- light

Most Volume -- 2 - 10μ
Particles >10μ -- few

PM_{10} -- 64 ug/m^3

07/22/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (μ)	MOST (μ)
Calcium Carbonate	60	20	5 - 10
Quartz/Mixed Clay	20	20	5 - 10
Carbon Soot	<1	5*	<1
Carbonaceous Flakes	5	30	5 - 10
Tire Rubber Dust	10	60	10 - 20
Fungal Spores/Pollens	1 - 5	---	---
Iron Oxides	<1	---	---

* Aggregate

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
K	16.7	Pb/oxides
Ca	100.0	PbBrCl
S	Trace	CuS
Fe	17.4	

FILTER

Color -- light grey
Loading -- light

Most Volume -- 5 - 10μ
Particles >10μ -- many

PM_{10} -- 27 ug/m^3

10/28/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (μ)	MOST (μ)
Calcium Carbonate	30	20	5 - 10
Quartz/Mixed Clay	45	15	5 - 10
Carbon Soot	1 - 5	5*	<1
Carbonaceous Flakes	20	40	10 - 20
Tire Rubber Dust	<1	20	2 - 10
Fungal Spores/Pollens	<1	---	---
Iron Oxides	<1	---	---

* Aggregate

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
Al	2.1	FeCuS
S	6.7	CuS
Cl	0.9	Pb/oxides
K	7.1	PbBrCl
Ca	100.0	
Fe	7.8	
Ti	1.0	
Cu	1.0	
Mg	0.3	

FILTER

Color -- dark grey-brown
Loading -- moderate

Most Volume -- 5 - 10μ
Particles >10μ -- few

PM_{10} -- 143 ug/m^3

10/30/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (μ)	MOST (μ)
Calcium Carbonate	60	25	5 - 10
Quartz/Mixed Clay	20	15	2 - 10
Carbon Soot	5	10*	<1
Carbonaceous Flakes	5	20	5 - 10
Tire Rubber Dust	10	30	5 - 10
Fungal Spores/Pollens	<1	---	---
Iron Oxides	<1	---	---

* Aggregate

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
Al	1.7	Pb/oxides
S	5.2	PbBrCl
K	6.3	
Ca	100.0	
Fe	6.2	

FILTER

Color -- dark grey-brown
Loading -- moderate

Most Volume -- 5 - 10μ
Particles >10μ -- moderate

PM_{10} -- 123 ug/m^3

11/04/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (μ)	MOST (μ)
Calcium Carbonate	15	20	5 - 10
Quartz/Mixed Clay	50	30	5 - 10
Carbon Soot	<1	25*	<1
Carbonaceous Flakes	10	30	5 - 10
Tire Rubber Dust	20	25	10 - 20
Fungal Spores/Pollens	1 - 5	---	---
Iron Oxides	<1	---	---

* Aggregate

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
K	17.5	Pb/oxides
Ca	100.0	PbFeCu
Fe	11.2	FeCuS
Cu	Trace	FeS
S	Trace	PbBrCl

FILTER

Color -- light grey
Loading -- light

Most Volume -- 5 - 10μ
Particles >10μ -- many

PM_{10} -- 30 ug/m^3

11/22/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (μ)	MOST (μ)
Calcium Carbonate	30	20	5 - 10
Quartz/Mixed Clay	60	30	5 - 10
Carbon Soot	1 - 5	10*	<1
Carbonaceous Flakes	1 - 5	30	5 - 10
Tire Rubber Dust	5	40	5 - 10
Fungal Spores/Pollens	<1	---	---
Iron Oxides	<1	---	---

* Aggregate

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
S	29.2	ZnAsS
K	12.6	FeCuS
Ca	100.0	CuS
Fe	11.5	Pb/oxides
		PbBrCl

FILTER

Color -- light grey
Loading -- light

Most Volume -- 5 - 10μ
Particles >10μ -- moderate

PM_{10} -- 35 ug/m^3

12/03/86

OPTICAL

COMPONENT	% VOLUME	LARGEST (μ)	MOST (μ)
Calcium Carbonate	50	15	5 - 10
Quartz/Mixed Clay	15	15	5 - 10
Carbon Soot	20	10*	<1
Carbonaceous Flakes	5	20	2 - 10
Tire Rubber Dust	1 - 5	15	2 - 10
Fungal Spores/Pollens	<1	---	---
Iron Oxides	<1	---	---

* Aggregate

SEM/XRM

ELEMENT	%	COMPOUNDS CONTAINING
Al	2.2	PbBrCl
S	14.1	Pb/oxides
K	7.3	FeCuS
Ca	100.0	
Fe	8.8	
Cu	Trace	
Mg	0.5	

FILTER

Color -- grey-black
Loading -- heavy

Most Volume -- 5 - 10μ
Particles >10μ -- few

PM_{10} -- 137 ug/m^3

TEXAS AIR CONTROL BOARD
AUSTIN TEXAS
INTEROFFICE

FROM: Scott Mgebroff, Chemist V, Inorganic Laboratory Section, Sampling and Analysis Division

TO: Vince Anselmo, Ph.D., Chief, Inorganic Laboratory Section, Sampling and Analysis Division

SUBJECT: Examination of SSI Filter

From my examination of the filter that was collected on January 30, 1986 at the El Paso Health Department site, I can make the following observations:

1. Most of the particulate, at least 90% by volume, is calcium carbonate; clay soil containing aluminum, silicon, potassium, calcium, titanium and iron; and quartz sand. These particles are less than 10μ in diameter, with most being in the 5-10μ range.

2. The remainder of the particulate is mainly carbonaceous in nature. Most of this particulate, at least 80% by volume, is carbon particles less than 1μ in diameter, with many being less than 0.5μ. The large number of these particles causes the particulate on the filter to be visually black. These particles are probably due to automobile emissions. There are also aggregates of these particles present which fall into the 1-10μ range. Also present are carbonaceous particles which are tan-to-reddish brown, equant, angular flakes which are 3-30μ in diameter. They may come from industrial processes such as boilers and/or from automobile exhaust systems.

3. A very small fraction of the particulate, less than 1% by volume, is tire rubber dust, fungal spores, pollens, iron oxides, and lead bromochloride compounds.

4. The filter is heavily loaded, so much so that a large percentage of the glass fiber surface is completely obscured.

I checked with Rollie Schroeder concerning the meteorological conditions during the week this sample was collected. There was a strong inversion in the El Paso area with winds exceeding 5 mph only rarely, and then only during periods of mountain "downwash." The weather observers also reported almost constant haze and smoke in all directions.

It would appear that the heavy loading of <10μ particles is due to industrial processes, automobile emissions, and soil re-entrainment in the El Paso area and not due to blowing dust.

If you have any questions on this matter, please feel free to contact me.

D-24 SIGNED: Scott Mgebroff

DATE: 4. 1, 1987

Texas Air Control Board

AUSTIN TEXAS

INTEROFFICE

FROM Dewayne Ehman, Ph.D., Chemist IV
Sampling and Analysis Division

TO Scott Mgebroff, Acting Director
Sampling and Analysis Division

SUBJECT Analysis of PM10 Filters from El Paso for Sulfate and Nitrate

I have analyzed the PM10 filters from El Paso site 1700002 as you requested. The method of analysis is given below and the results are attached.

Method of Analysis: A one-inch filter strip was cut from each filter to be analyzed. The filter strips were cut into small pieces with scissors and placed in numbered 125-ml Erlenmeyer flasks. Then 50 ml of distilled water was added to each flask and the flask covered with Parafilm. All flasks were placed in a water bath and ultrasonicated for one hour. They were then allowed to stand overnight. The next day the contents of the flasks were filtered using a vacuum-filtration system. The filtrates were put into numbered 50-ml screw-capped tubes. A blank was prepared at the same time as the samples using a one-inch filter strip from a filter with the same numbering system as those for the samples. Duplicates were extracted and analyzed to test the method's average precision. Standards were analyzed as unknowns to test the method's average accuracy. Spiked samples were extracted and analyzed to test the method's average recoverability. The samples were analyzed using a Dionex ion chromatograph. A standard curve was run before the samples were injected, and the results for the unknowns were calculated by using the standard curve. All results are corrected for nitrate and sulfate in the blank filter strip.

If you have any questions, please feel free to contact me.

Attachment

cc: Joe Panketh, Control Strategy Division

bcc: DEhman/drl; Board, File

SIGNED Dewayne Ehman

DATE June 21, 1988

Results of Analysis of PM10 Filters from El Paso for Sulfate and Nitrate

Sample ID/MDL	Run Date	PM10 (µg/m³)	Nitrate (µg/m³)	Sulfate (µg/m³)
1	1/10/86	161	4.95	7.87
2	1/11/86	163	3.37	5.77
3	1/14/86	194	5.84	4.92
4	1/20/86	139	0.92	5.74
5	1/30/86	324	7.13	6.46
6	1/23/86	135	1.58	5.94
7	2/01/86	47	0.60	4.66
8	3/06/86	164	1.97	3.86
9	3/09/86	240	0.50	5.36
10	4/02/86	204	0.84	3.30
11	4/05/86	154	2.55	7.62
12	4/13/86	123	0.80	3.46
13	4/17/86	136	0.79	3.66
14	5/24/86	128	1.37	6.92
15	6/14/86	64	0.42	8.30
16	7/22/86	27	0.14	3.34
17	10/28/86	144	0.89	5.80
18	10/30/86	123	0.94	3.89
19	11/04/86	30	0.15	3.22
20	11/22/86	35	0.18	3.99
21	12/03/86	137	1.65	4.85
MDL	-----------	-----	0.07	0.07

The method's average precision was -8% for nitrates and 2% for sulfates. The method's average accuracy (% difference from the true values) was -2% for nitrates and -5% for sulfates. The method's average recoverability was 102% for nitrates and 107% for sulfates.

Texas Air Control Board

AUSTIN TEXAS

INTEROFFICE

FROM Scott Mgebroff, Acting Director
Sampling and Analysis Division

TO Joe Panketh
Control Strategy Division

SUBJECT Analysis of PM10 Filters from El Paso for Sulfate and Nitrate

Yesterday you received a copy of a memo from Dewayne Ehman to me containing the results of the above-referenced filter analyses. Please be aware that the results for the sulfate are probably high due to artifact formation on the filter and that results for nitrate are probably low due to chemical reactions causing the off-gassing of nitrogen oxides. These phenomena are well documented in the literature. You might want to discuss it further with Stuart Dattner.

If you have any questions concerning the data, please feel free to contact me.

SIGNED Scott Mgebroff

D-27

DATE June 22, 1988