ECOlogical supporting for traffic
Management in cOastal areas By using an
InteLlIgenT sYstem
01/01/2018 - 30/09/2019

Analysis report in Venice

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Version: final

Distribution: Public

Date: 30 September 2019

WP3: Assessment of the effect of ship traffic to particulate matter

ACT 3.1: Experimental activities in Venice

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INTRODUCTION

In this report all the experimental activities carried out in Venice within activity 3.1 of the ECOMOBILITY project are described. The activity includes sampling of particulate matter in different size, chemical analysis, high-resolution measurements and measurement of ancillary data. In this report no investigation about the sources of pollution is conducted, since it will be the subject of the deliverable "Assessment of the impact of shipping to particulate matter in Venice and Rijeka". The two deliverables are strictly connected, since the results of one are the input for the other.

This report is composed of two parts:

- the first part is dedicated to the sampling of particulate matter in different size and chemical characterisation;
- the second part is dedicated to the high-resolution measurements of particulate matter and related parameters.

In every chapter, the procedures carried out and the main results are reported.

LIST OF CONTENTS

PART I

Sampling and chemical analysis

1. SAMPLING

Particulate sampling was carried out at the monitoring station of the Protection and Prevention Agency of Veneto region (ARPAV) in Sacca Fisola, Venice (45°25'40.14'' N; 12°18'36.73'' E) from August to November 2018 and in April 2019, using a model 110 MOUDI cascade impactor. The sampler allows to separate particles of different sizes. It is equipped with an inlet stage with cut-point 18 µm (collecting particles with diameter above 18 µm) followed by ten additional stages to size-fractionate aerosol particle samples and at the end a backup filter, collecting particles with diameter below the last cut-point (0.056 µm), which have not been collected by the previous stages. The complete list of the dimension of particles collectable with this sampler is reported in Table 1.1.

In the discussion the particulate matter could be often divided into coarse (>1 µm) particles, represented by stages from the inlet stage to stage 5, fine particles (between 0.1 µm and 1 µm), represented by stages from 6 to 9 and ultrafine particles or nanoparticles (<0.1 µm), represented by the stage 10 and the backup. Moreover particulate matter can be also divided in PM_{10}, including particles with dimension below 10 µm (stages from 2 to backup), PM_1, corresponding to the sum of fine and ultrafine particles (stages from 6 to backup) and $PM_{0.1}$, corresponding to ultrafine particles (stage 10 and backup).

Table 1.1. Dimension of collected particles.

Stage	Size
Inlet stage	>18 µm
Stage 1	18-10 µm
Stage 2	10-5.6 µm
Stage 3	5.6-3.2 µm
Stage 4	3.2-1.8 µm
Stage 5	1.8-1.0 µm
Stage 6	1-0.56 µm
Stage 7	0.56-0.32 µm
Stage 8	0.32-0.18 µm
Stage 9	0.18-0.10 µm
Stage 10	0.10-0.056 µm
Backup	<0.056 µm

Weekly samples were collected on quartz fiber filters (47 mm diameter). Dates and sampled air volume is reported in Table 1.2. For every set of 12 sample filters, a field blank filter was taken by loading, carrying and installing the filter holder in the instrument with the air pump turned off. Globally, we collected 20 field blanks; 16 in 2018 and 4 in 2019.

Table 1.2. Dates and samples air volume of particulate matter samples.

Sample number	Start date	End date	Volume (m^3)
Sample 1	02/08/2018	09/08/2018	183.8
Sample 2	09/08/2018	16/08/2018	182.5
Sample 3	16/08/2018	23/08/2018	191.0
Sample 4	23/08/2018	30/08/2018	187.2
Sample 5	30/08/2018	05/09/2018	172.9
Sample 6	10/09/2018	17/09/2018	184.0
Sample 7	17/09/2018	24/09/2018	200.3
Sample 8	24/09/2018	02/10/2018	234.6
Sample 9	02/10/2018	09/10/2018	204.0
Sample 10	09/10/2018	16/10/2018	210.7
Sample 11	16/10/2018	23/10/2018	224.5
Sample 12	23/10/2018	30/10/2018	212.7
Sample 13	30/10/2018	07/11/2018	242.4
Sample 14	07/11/2018	14/11/2018	210.5
Sample 15	14/11/2018	22/11/2018	233.4
Sample 16	22/11/2018	27/11/2018	153.8
Sample 17	01/04/2019	08/04/2019	229.1
Sample 18	09/04/2019	16/04/2019	211.4
Sample 19	16/04/2019	23/04/2019	213.2
Sample 20	23/04/2019	30/04/2019	204.3

Samples and blanks collected in 2018 were used to evaluate the size distribution of:

- particulate matter concentration;
- concentration of ions associated to particulate matter;
- concentration of metals associated to particulate matter;
- concentration of carbon associated to particulate matter.

For this purpose, after the evaluation of the concentration of particulate matter, filters were cut and the single pieces underwent different treatments. A half of the filter was analysed for metals; a square part of the filter of 1 cm^2 of area was analysed for carbon and the remaining filter was analysed for ions.

Samples and blanks collected in 2019 were used to evaluate the size distribution of polycyclic aromatic hydrocarbons (PAHs) associated to particulate matter.

2. PARTICULATE MATTER CONCENTRATION

2.1. Material and methods

Blanks and sampled filters collected in 2018 were weighed three times over 24 hours before and after the sampling, after a conditioning period of 48 hours. The balance and the filters were kept at humidity controlled (45±5 %) in glove box before and during the weighting procedure, in order to prevent errors in the weights due to the hygroscopy of the quartz filters. Relative deviation standard of the weights was always below 0.5%. The temperature was 25±5 °C.

The weights of the filters before the sampling were subtracted to the weights of the corresponding filters after the sampling, to obtain the quantity of the deposited material. The average quantity of the blanks were subtracted to the weights of all samples, in order to correct a potential contribution due to contamination during transport, conservation and manipulation of samples. The concentration in air was obtained from the sampled air volume, calculated from the flux of the instrument and the sampling time. Concentration values below the detection limit, calculated as the blank average plus three times the standard deviation of the blanks, were rejected.

2.2. Results and discussion

The concentration of particulate matter in different size is reported in the Annex (Table A1). The term "ND" indicates not detected values (values below the detection limit).

Weekly values of total particulate matter, calculated as the sum of all stages, ranged from 19 $\mu g/m^3$ to 51 $\mu g/m^3$ during the period August - November 2018, with an average of 34 $\mu g/m^3$, with no specific trend along the period of sampling. The distribution of coarse, fine and ultrafine particles in the samples shows that 65% of particulate matter is constituted of coarse particles, 33% of fine particles and 2% of ultrafine particles, on average (Figure 2.1).

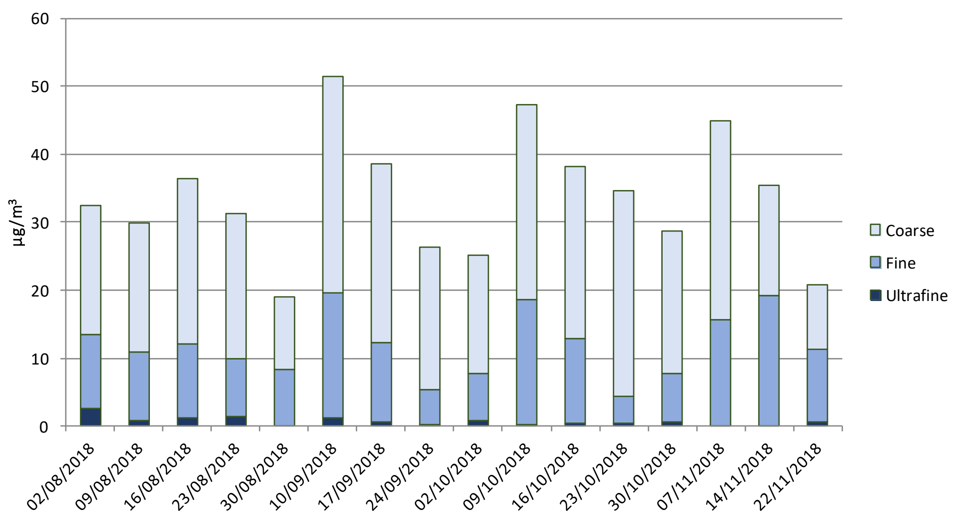

Figure 2.1. Distribution of coarse, fine and ultrafine particles in the weekly samples of particulate matter.

The size distribution of particulate matter (Figure 2.2) shows a bimodal distribution, with peaks of concentration at around 3.2 - 10 µm and 0.56 - 1.0 µm. A previous study focusing on the size distribution of particulate matter collected with a similar sampler in the area of Venice[1] evidenced also a third mode below 0.056 µm, less visible in this work. Coherently, the previous study reported a higher percentage of ultrafine particles to total suspended particulate (18%) with respect to this work. No different can be observed comparing the size distribution of particulate matter in summer and fall (Figure 2.3).

[1] Barbaro et al., Science of the Total Environment 658 (2019) 1423-1439

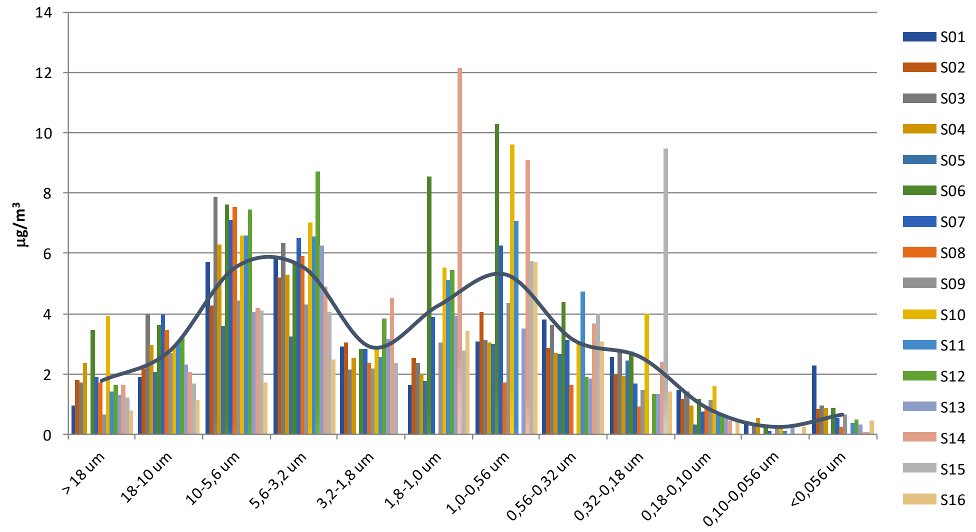

Figure 2.2. Size distribution of particulate matter from August to November 2018.

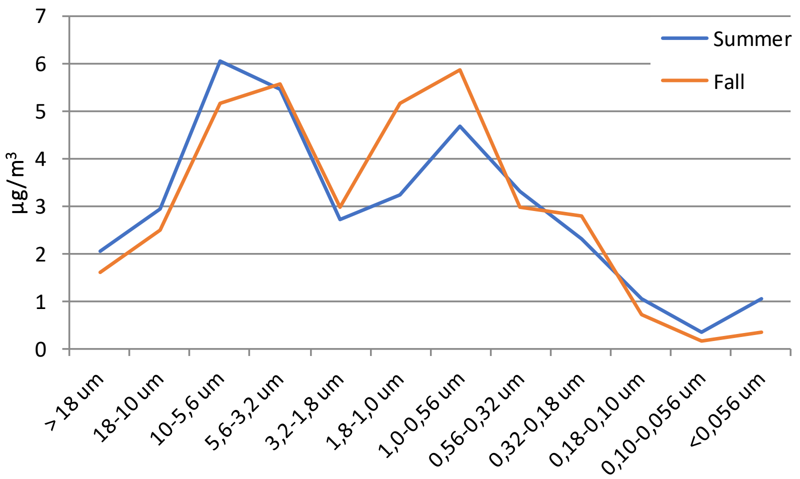

Figure 2.3. Comparison of the average size distribution of particulate matter in summer and fall.

3. ANALYSIS OF IONS

Globally, the following species have been analysed:

- Anionic species: clorure (Cl^-), nitrate (NO_3^-), sulfate (SO_4^{2-}), bromide (Br^-) and methanesulfonate (MSA^-);
- Carboxylic acids: C_1-formic, C_2-oxalic, C_2-acetic, C_2-glycolic, C_3-malonic, C_4-succinic, *h*C_4-malic, *cis-us*C_4-maleic, *trans-us*C_4-fumaric, C_5-glutaric, C_6-adipic and C_7-pimelic acids;
- Cationic species: sodium (Na^+), ammonium (NH_4^+), potassium (K^+), magnesium (Mg^{2+}) and calcium (Ca^{2+}).

3.1. Material and methods

An ion chromatograph (IC, Thermo Scientific DionexTM ICS-5000, Waltham, MA, USA) coupled with a single quadrupole mass spectrometer (MS, MSQ PlusTM, Thermo Scientific, Bremen, Germany) was used to analyze all anionic compounds and carboxylic acids.

The chromatographic separation of anionic species and carboxylic acids was conducted using an anionic exchange column (Dionex Ion Pac AS 19 2 × 250 mm) and a guard column (Dionex Ion Pac AG19 2 × 50 mm). The gradient of sodium hydroxide (NaOH), produced by an eluent generator (Dionex ICS 5000EG, Thermo Scientific), with a 0.25 mL min^{-1} flow rate was: 0-6 min, 15 mM; 6–15 min gradient from 15 to 45 mM; 15-23 min, 45 mM; 23–28 min, equilibration at 15 mM. The injection volume was 100 µL. A suppressor (ASRS 500, 2 mm, Thermo Scientific) removed NaOH before entering the (-)-ESI source of mass spectrometer, that operated in Single Ion Monitoring (SIM) mode (Figure 3.1).

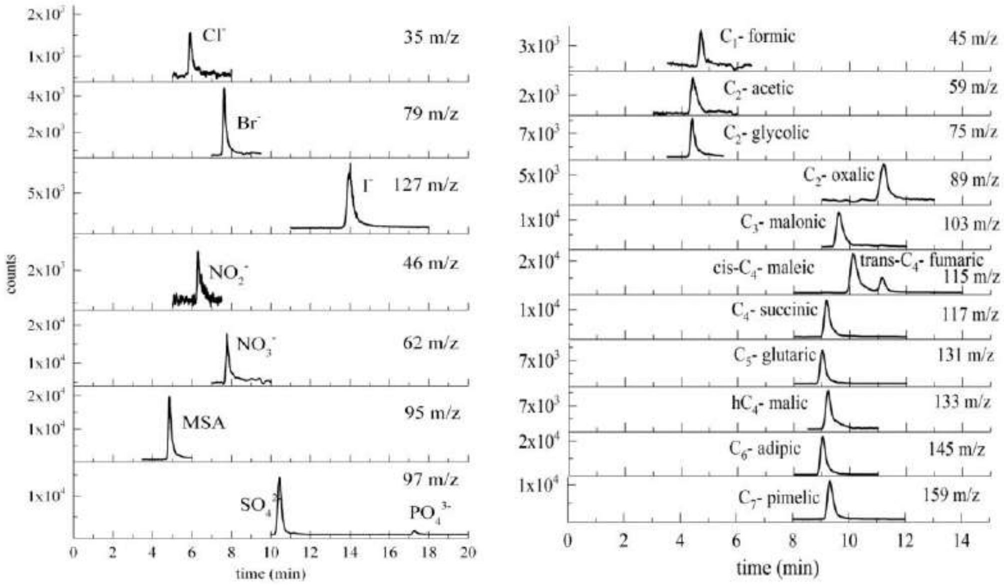

Figure 3.1. Chromatogram of major ions and carboxylic acids.

A capillary ion chromatograph was also used to determine cationic species, equipped with a Ion Pac CS19–4mm capillary cation-exchange column (0.4x250 mm) equipped with an Ion Pac CG19–4mm guard column (0.4x50 mm) and the species were determine using a conductivity detector. The gradient of methanesulfate (MSA), produced by an eluent generator, with a 0.012 mL min^{-1} flow rate was: 0-10 min, 2 mM; 10-20 min, 9 mM; 20-30 min, equilibration at 2 mM. The injection volume was 0.4 µL (Figure 3.2).

Only concentration values above the quantification limit, calculated as the average instrumental blank plus ten times the standard deviation of the blanks, were taken into consideration. If concentration values were below the quantification limit, but above the detection limit, calculated as the average instrumental blank plus three times the standard deviation of the blanks, the corresponding ion was considered detected, but its concentration was not considered reliable and was descarded.

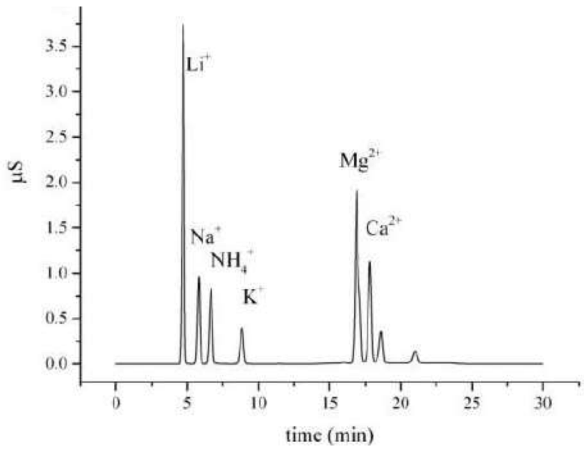

Figure 3.2. Chromatogram of cations.

3.2. Results and discussion

The concentration of each species in each sample is reported in the Annex (Table A2). The term "ND" indicates not detected ions (values below the detection limit); the term "DET" indicates that the ion is detected, but its concentration cannot be taken into consideration (concentration value above the detection limit, but below the quantification limit). Method detection limits (MDL) and method quantification limits (MQL) are reported in the annex (Table A3).

Some ions are characterised by a very low concentration in particulate matter and are detected in very few cases or not detected at all. Since a size distribution evaluation is not possible with so little concentration values, the following ions have not been taken into consideration in the discussion: Ca^{2+} (7 detected values out of 192), C_1-formic (no detected values), C_2-acetic (no detected values), C_2-glycolic (13 detected values out of 192), *cis-us*C_4-maleic (12 detected values out of 192), *trans-us*C_4-fumaric (3 detected values out of 192), C_5-glutaric (1 detected value out of 192), C_6-adipic (2 detected values out of 192) and C_7-pimelic (1 detected value out of 192) acids.

Distribution of ions in particulate matter

In Table 3.1 the concentration of ions is summarised reporting the median, the first and third quartiles of the distribution. At this stage, concentration of samples is referred to the total suspended particulate, calculated as the sum of all the dimensional classes. All the sum values are reported in Table A2 of the Annex, in red. The term "NQ" indicates values that cannot be calculated, since all addends are not detected.

The most present ions are sulfate (31%), nitrate (29%) and chloride (19%), as shown in Figure 3.3.

Table 3.1. Distribution parameters (median, first and third quartiles) of the concentration of ions in total suspended particulate (ng/m^3).

	Median	First quartile	Third quartile
Cl^-	2155	1686	2651
NO_3^-	2673	1616	3824
SO_4^{2-}	3210	2538	4763
MSA	21.71	17.87	28.07
Br^-	8.465	7.302	9.062
C_2-oxalic	150.8	106.9	187.5
C_3-malonic	23.38	14.91	32.78
C_4-succinic	4.234	0.7765	8.016
hC_4-malic	24.68	11.47	37.14
Na^+	1270	404.5	1539
NH_4^+	836.1	502.5	1083
K^+	185.6	122.0	257.2
Mg^{2+}	127.9	95.67	179.9

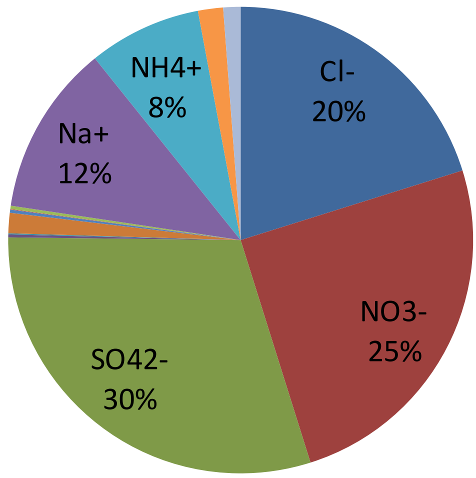

Figure 3.3. Median distribution of analysed ions in total suspended particulate matter.

Size distribution of ions

The distribution parameters (median, first quartile and third quartile) of ions among the various dimensional classes are reported in Table A4 of the Annex.

The aerodynamic diameter of aerosol particles (Figure 3.4) can suggest the source of aerosol particles and it can determine their lifetime and their physical and chemical proprieties.

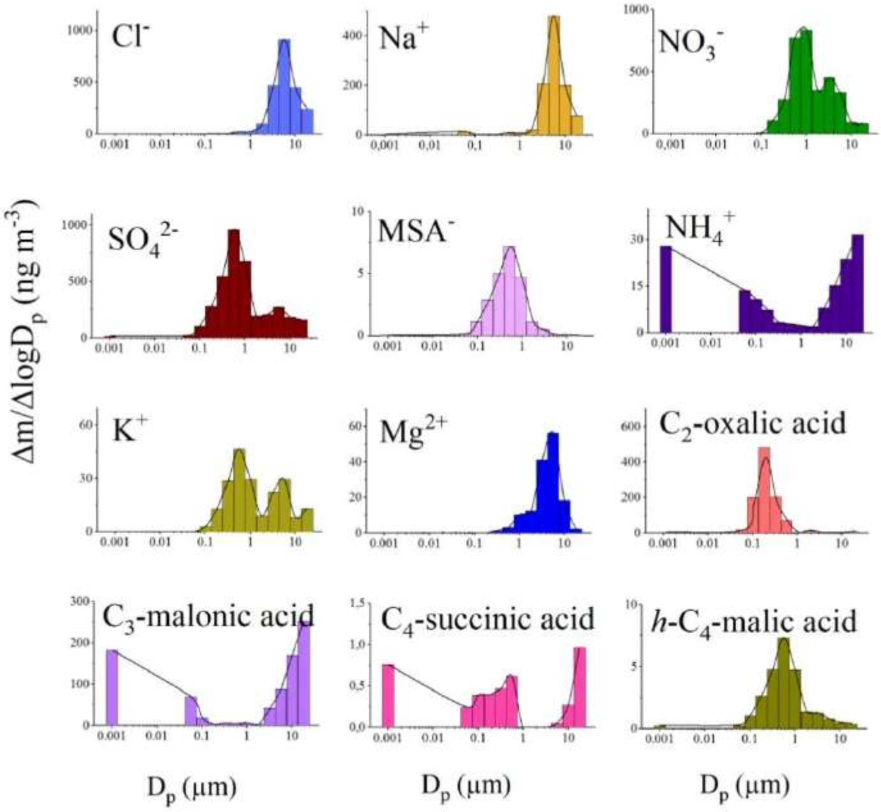

Figure 3.4. Average size distribution of ions.

Cl^{-} (20% of the total ion concentration), Na^{+} (12%) and Mg^{2+} (1%) were mainly distributed on the coarse fraction because the predominant source was probably sea-salt. The presence of other sources of chloride can be excluded because anthropogenic emissions, such as waste incineration and secondary aerosol formation, usually produce chloride in the fine mode, not detected in this study.

A bimodal size distribution of NO_3^{-} (25%) was observed during this study, because the median concentrations peaked at 3.2–5.6 µm and at 0.56–1 µm. The NO_3^{-} concentration in the fine mode was larger than that in the coarse mode. The formation of nitrate in the fine mode can be explained though two pathways: in-cloud processes and gas-to-particle condensation of its precursors onto preexisting particles. High sea salt concentrations could contribute to the production of nitrate in the coarse mode, following the reaction $HNO_3(g) + NaCl \rightarrow NaNO_3 + HCl(g)$ with a consequent chloride depletion.

Two different sources of sulfate, which represented 30% of the total ions, can be recognized by distinguishing between non-sea-salt sulfate (nss-SO_4^{2-}) and sea salt sulfate (ss-SO_4^{2-}). ss-SO_4^{2-} has mainly primary source and it was distributed on the particles with diameter above 1 µm, showing a monomodal particle size distribution similar to Cl^- and Na^+. Nss-SO_4^{2-} was mainly distributed in the accumulation mode, and it can have both anthropogenic and biogenic sources from secondary sources. The biogenic emission is also confirmed by MSA, useful tracer of marine biogenic origin, which mainly distributed in the fine mode.

Two different modes of NH_4^+ are recognized in the coarse and ultrafine fractions. The presence of ammonium in the coarse mode is correlated with the sea salt, while its occurrence in the ultrafine mode needs further investigation, but we can speculate about the formation from its gaseous precursor ammonia (NH_3) though gas-phase and aqueous-phase reactions with acidic species (e.g. H_2SO_4).

Several sources can be attributed to K^+, including sea-salts, soil derived particles, biomass burning and vegetation. Considering the size distribution, the sea salt contributed to K^+ concentrations only in the particles with diameter above 1 µm. The presence in the submicron particles suggested that other sources were predominant, such as long-range atmospheric transport from biomass burning sources.

In the urban atmosphere, carboxylic acids are mostly produced by photochemical oxidation of organic precursors with ozone, OH radical, NO_x and other oxidants and by traffic-related emissions. Other important sources of these acids can be biomass burning, emitted fresh smoke, which are pyrolysis products of plant tissue, fossil fuel combustion and marine emission.

The most abundant carboxylic acid was C_2-oxalic acid (1% of the total ions), which is mainly distributed in the fine fraction. C_2-oxalic acid is the main product of reactions that transform the long chain acids into oxalic acid. It is probably distributed in the accumulation mode because it can undergo atmospheric long-range transport.

To investigate the potential source of carboxylic acids, C_3-malonic acid to C_4-succinic acid ratio can be used as an indicator of enhanced photochemical production of diacids. Indeed, C_4-succinic acid can degraded to C_3-malonic acid by decarboxylation reactions activated by OH radicals. C_3-malonic acid and C_4-succinic acid demonstrated the same particle size distribution. The C_3/C_4 ratio had a mean value of 13±10, suggesting that secondary atmospheric reactions as the main sources of these two acids because the C_3/C_4 for vehicular exhaust is usually lower (0.25–0.44).

4. ANALYSIS OF METALS

Globally, the following species have been analysed: lithium (Li), beryllium (Be), titanium (Ti), vanadium (V), chromium (Cr), manganese (Mn), iron (Fe), cobalt (Co), nickel (Ni), copper (Cu), zinc (Zn), gallium (Ga), germanium (Ge), arsenic (As), selenium (Se), rubidium (Rb), strontium (Sr), molybdenum (Mo), silver (Ag), cadmium (Cd), indium (In), cesium (Cs), barium (Ba), tantalum (Ta), tungsten (W), thallium (Tl), lead (Pb), bismuth (Bi), uranium (U).

4.1. Material and methods

The determination of metals in the particulate matter was carried out by mineralization of the half of each filter and subsequent instrumental analysis with ICP-MS (Inductively Coupled Plasma-Mass Spectrometry, iCAP RQ, ThermoScientiphic). The mineralization of the half quartz filters was achieved using a Microwave (Ethos1-Milestone) and a mixture of ultrapure reagents: nitric acid, fluoridric acid, and hydrogen peroxide. The temperature program for microwave mineralization consists of a heating up to 190 °C and a temperature maintenance for 15 min. The solutions obtained from microwave mineralization were then diluted to 50 ml with fully deionized ultrapure water (18 MΩ/cm resistivity) produced using the Purelab Ultra system (Elga, High Wycombe, UK). The ICP-MS was calibrated using the multi-elemental standard solution IMS-102 (10 µg/l, Ultrascientific, USA). The calibration lines had R^2 = 0.999 for arsenic and R^2= 1 for all other elements. A standard reference material was used at known concentrations (NIST 1648a) to evaluate recoveries that ranged between 90% and 100%. The concentrations of the elements were obtained subtracting those found in blanks. Concentration values were considered only if they were above the detection limit, calculated as the average instrumental blank plus three times the standard deviation of the blanks.

4.2. Results and discussion

The concentration of each species in each sample is reported in the Annex (Table A5). The term "ND" indicates not detected values (below the average blank). Detection limits for metals are reported in Table A6.

Some metals are characterised by a very low concentration in particulate matter and are detected in very few cases. Since a size distribution evaluation is not possible with so little concentration values, the following metals have not been taken into consideration in the discussion: Be (14% of detected values); As (9% of detected values), Ag (6% of detected values), In (6% of detected values), Cs (6% of detected values), Ta (6% of detected values), W (6% of detected values), Tl (6% of detected values) and Bi (6% of detected values).

Distribution of metals in particulate matter

In Table 4.1 the concentration of metals is summarised reporting the median, the first and third quartiles of the distribution and the number of samples for which concentration values are below the black, thus have not been considered for the evaluation. At this stage, concentration of samples are referred to the total suspended particulate, calculated as the sum of all the dimensional classes. All the sum values are reported in Table A5 of the Annex, in red.

Table 4.1. Distribution parameters (median, first and third quartiles) of the concentration of metal in total suspended particulate (ng/m^3); number of samples for which concentration values are below the blank.

	Median	First quartile	Third quartile	n. samples < blank
Li	0.773	0.253	0.968	0/16
Ti	49.6	30.1	61.4	0/16
V	3.17	2.88	3.91	0/16
Cr	9.32	5.10	20.55	0/16
Mn	12.46	9.60	14.48	0/16
Fe	393	327	451	0/16
Co	0.263	0.217	0.352	2/16
Ni	5.38	3.92	7.79	0/16
Cu	9.16	7.32	12.83	0/16
Zn	31.8	20.1	44.2	0/16
Ga	0.492	0.227	0.604	0/16
Ge	2.18	0.65	2.94	0/16
Se	2.65	1.84	4.45	0/16
Rb	1.58	0.82	2.15	2/16
Sr	8.38	5.28	11.27	0/16
Mo	37.7	16.8	55.3	5/16
Cd	1.72	0.64	3.18	8/16
Ba	15.6	4.5	20.2	0/16
Pb	7.95	2.83	11.09	2/16
U	0.183	0.081	0.304	9/16

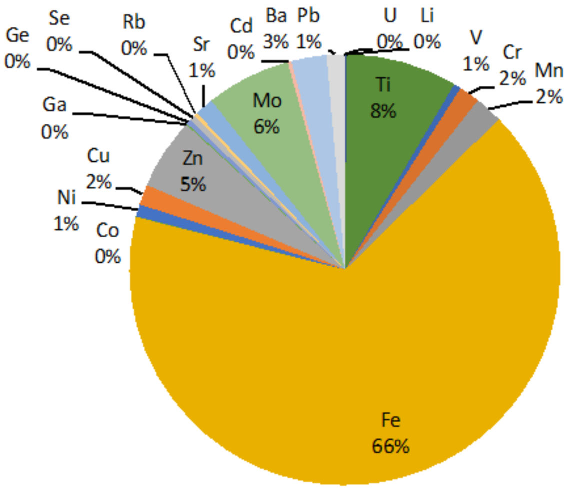

Figure 4.1. Median distribution of metals in total suspended particulate matter.

Among the analysed metals, the most present are iron (66%), titanium (8%), molybdenum (6%) and zinc (5%), as shown in Table 4.1.

Size distribution of metals

The distribution parameters (median, first quartile and third quartile) of metals among the various dimensional classes are reported in Table A7 of the Annex.

Many metals, as lithium, titanium, manganese, iron, copper, barium, and strontium, are mainly distributed in the coarse fraction, since the median shows a peak at stage 3 (or 2 in the case of Sr). Germanium's size distribution seems to be bimodal, with an increment at coarse fraction and at 0.32-0.18 µm dimension range (Figure 4.2).

Some metals, showing a peak of concentration at stages 7 or 8 (0.56- 0.18 µm), are mainly distributed in the fine fraction, as selenium, vanadium, cadmium and lead, indeed these elements are influenced by anthropogenic emissions.

Chromium, rubidium, cobalt, and gallium have a trimodal distribution, since their concentration shows three peaks at stages 2-3 (coarse fraction), 5-6 (fine fraction), and 10-backup (ultrafine particles).

Nickel has a particular size distribution, with no evident concentration peak, but an affinity with the fine fraction may be noticed.

The distribution size of zinc is peculiar, as it shows a maximum concentration at 1.8-1.0 µm dimension range.

Molybdenum has concentration almost similar for all the dimension ranges, while uranium shows affinity for both coarse and fine mode.

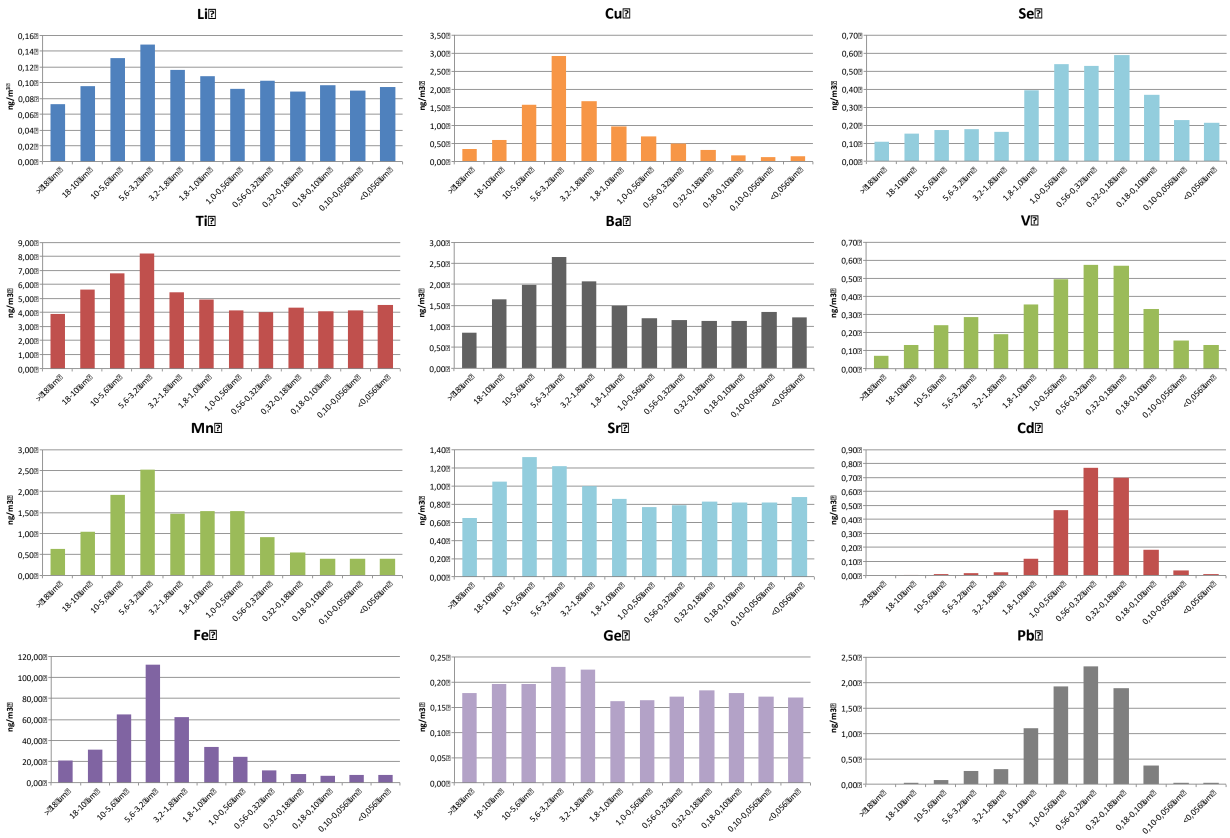

Figure 4.2. Median size distribution of metals.

5. ANALYSIS OF CARBON

Globally, the following carbonaceous fractions have been determined: elemental carbon (EC), organic carbon (OC) and Total Carbon (TC).

5.1. Material and methods

Determinations of OC and EC were obtained applying a thermo-optical transmittance (TOT) method for charring carbon correction using a Sunset laboratory carbon analyzer (Sunset Laboratory Inc., OR, USA) with temperature offset correction. Punches of 1.0 cm^2 were cut from the fibre quartz filters and analysed according to the EUSAAR2 protocol, designed as the European standard procedure in the European Supersites for Atmospheric Aerosol Research.
Calibration (multipoint) allowed the accuracy of EC/OC analysis, by using as external standard a sucrose solution (2.198 gC/L in water, CPAchem Ltd). Specifically, the average value of OC observed in blank filters was subtracted from those measured in the samples. Instead, a suitable reference material composed of pure EC is still lacking[2]. Therefore, measured OC and EC concentrations were corrected using this calibration.
Furthermore, analysis of blank filters was carried out to correct concentrations of measured ambient samples (from eventual contamination of EC and OC).

5.2. Results and discussion

The concentration of each species in each sample is reported in the Annex (Table A8). Total carbon (TC) is calculated as the sum of EC and OC. ΔEC, ΔOC and ΔTC represent the error associated to EC, OC and TC, respectively. The term "NQ" indicates values that cannot be quantified.

Distribution of carbon in particulate matter

In Table 5.1 the concentration of carbonaceous fractions (OC, EC and TC) is summarized reporting the median, the first and third quartiles of the distribution. At this stage, concentration of each sample is referred to the total suspended particulate, calculated as the sum of all the twelve dimensional classes Table A8 of the Annex, in red values).

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[2] Baumgardner et al., Atmospheric Measurement Techniques 5 (2012), 1869–1887

Table 5.1. Distribution parameters (median, first and third quartile) of the concentration of carbonaceous fractions in total suspended particulate (μg/m^3).

	Median	First quartile	Third quartile
OC	0.23	0.024	0.26
EC	0.08	0.003	0.11
TC	0.37	0.051	0.42

Size distribution of carbon

The distribution parameters (median, first quartile and third quartile) of carbon among the various dimensional classes are reported in Table A9 of the Annex.

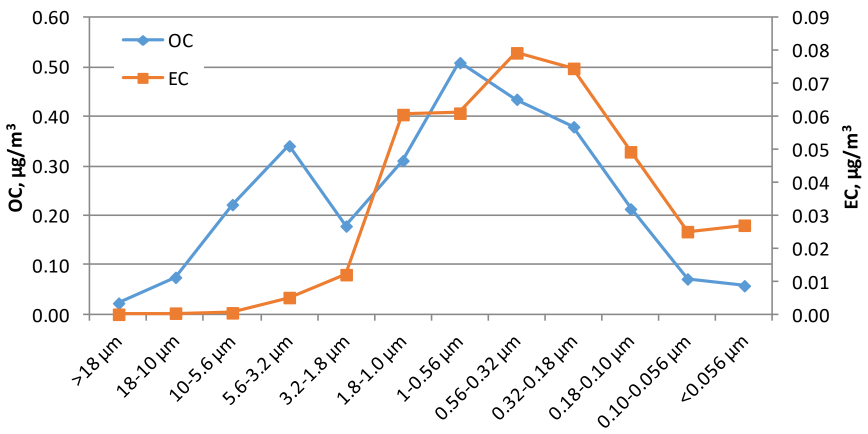

Figure 5.1. Median size distribution of organic (OC) and elemental (EC) carbon.

In general terms, average values of 3.2 μg/m^3 and 0.4 μg/m^3 were recorded for OC and EC, respectively. The average uncertainty of the determination of OC was within 5% in agreement with other scientific works[32].

Maximum concentration values of OC (and TC) were found for samples 10 (09-16/10/2018) and 11 (16-23/10/2018), as reported in Figure 5.2. However, this trend was not also observed for PM concentration (Section 2.1).

For all collected samples, OC accounted, on average, for about 88% of TC and a ratio OC/EC of about 8.4 was found. Also, poor correlation between OC and EC suggested production of secondary OC in the investigated site.

[3] Merico et al., Environmental Science and Pollution Research (2019), 1-17

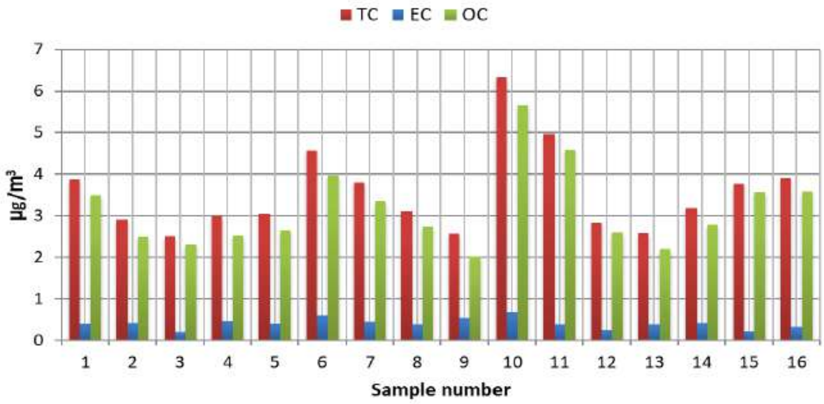

Figure 5.2. Sample concentration of OC, EC and TC.

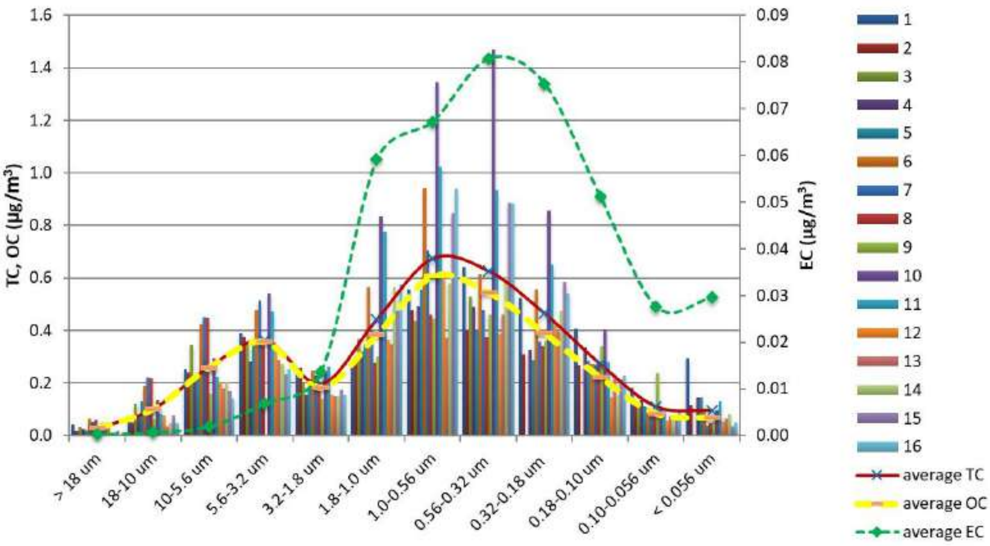

Figure 5.3. Size distribution of OC, EC and TC for all samples collected (as histogram) and average per stage concentration value (as lines).

The size distribution of carbon fractions in PM samples shows a bimodal distribution (Figure 5.3), especially for TC and OC, with peaks of concentration at stage 3 (3.2 – 5.6 µm) and 6 (0.56 - 1 µm). Size distribution of EC was different with sub-micrometric two modes, less defined each other, at stages 5 (1.8 – 1 µm) and 7 (0.56 - 0.32 µm). This is compatible with the different nature of sources of EC, which is a primary tracer of combustion processes, compared to OC, which can be a primary and a secondary pollutant. In terms of absolute concentrations, the largest concentration of OC and TC (samples 10 and 11) were clearly distributed between stage 5 and 8.

6. ANALYSIS OF POLYCYCLIC AROMATIC HYDROCARBONS

Sixteen of the US Environmental Protection Agency priority polycyclic aromatic hydrocarbons (PAHs) were analysed: acenaphthylene (ACY), acenaphthene (ACE), fluorene (FL), phenanthrene (PHE), anthracene (ANT), fluoranthene (FLT), pyrene (PYR), benzo[a]anthracene (BaA), chrysene (CHR), benzo[b]fluoranthene (BbF), benzo[k]fluoranthene (BkF), benzo[a]pyrene (BaP), benzo[ghi]perylene (BghiP), indeno[1,2,3-c,d]pyrene (IcdP) and dibenzo[a,h]anthracene (DahA).

6.1. Material and methods

For preparing the sample for analysis, filters were extracted with organic solvents. Before the extraction blanks and samples were spiked with a known amount of a ^{13}C-PHE, as isotopically enriched quantification standard. Filters were broken down into small pieces and mixed with diatomaceous earth; then they were extracted with a *n*-hexane/dichloromethane mixture (1:1, *v/v*) using an Automatic Solvent Extractor (ASE), at 100°C and high pressure for 2 cycles (static extraction 5 min). Before the instrumental analysis, the volume of each extract was reduced to 100 µL and the solvent was changed to isooctane, for limiting evaporation.

The determination of PAHs was conducted with a triple quadrupole mass-spectrometer (Thermo Scientific TSQ9000), coupled with a Thermo Scientific Gas-chromatograph Trace 1310, equipped with a HP-5ms GC Column (60 m, 0.25 mm, 0.25 µm). The gas-chromatograph oven temperature program was the following: 70°C, 20°C/min to 200°C (5 min), 10°C/min to 250°C (5 min), 15°C/min to 280°C (5 min), 10°C/min to 310°C (10 min). A flow rate ramp was set up: 1.2 ml/min (30 min), 2 ml/min/min to 2 ml/min (7.1 min).

Quantification was performed using internal standards and the isotopic dilution technique: peak areas were compared directly with those of the congener used as internal standards and added to the samples in known quantities. Concentrations of the analytes in the sample were calculated and corrected using the instrumental response factors, previously obtained by the analysis of a solution containing all the native congeners and ^{13}C-PHE. These solutions were periodically analysed and the response factors were recalculated, in order to correct the linearity of the response. Peak areas were considered only if peaks were characterised by a signal to noise (S/N) ratio above 10 (quantification limit). If the S/N was between 3 (detection limit) and 10 the corresponding congener was assumed as detected, but its concentration was not quantified. The average concentration values in blanks were subtracted to the concentration of the corresponding congeners in the samples, in order to correct a potential contribution due to contamination during the whole procedure. When the area of the peaks related to the quantification standard was too small for an accurate quantification (peak with S/N below 10), PAHs concentration was not quantified and values for all congeners are indicated as NQ (not quantifiable) in the table. Analogously, if a response factor related to a congener assumed an anomalous value, concentration values of that congener in all the sample using that response factor for the quantification were rejected.

6.2. Results and discussion

The concentration of each species in each sample is reported in the Annex (Table A10). The term "NQ" indicates non quantifiable concentration values; the term "ND" indicates that the compound is not detected (S/N below 3), the term "DET", indicates that the compound is detected, but its concentration cannot be taken into consideration for further evaluations (S/N between 3 and 10). Since samples 17 and 18 are characterised by a lot of missing concentration values, the discussion will focus only on the last two samples (weeks 16-23 April 2019 and 23-30 April 2019).

Distribution of PAHs in particulate matter

In Table 6.1 concentration of PAHs in total suspended particulate is reported. The concentration is calculated as the sum of all the dimensional classes.

Table 6.1. Concentration of PAHs in total suspended particulate (ng/m^3). ND: non detected; NQ: non quantifiable.

	16-23 Apr 19	23-30 Apr 19
NAP	0.501	0.152
ACY	ND	0.024
ACE	0.041	0.140
FL	0.034	0.071
PHE	0.540	0.331
ANT	0.206	0.055
FLA	NQ	0.122
PYR	0.019	0.108
BaA	0.008	0.004
CHR	0.659	0.022
BbF	0.279	0.009
BkF	0.210	0.017
BaP	0.323	0.001
BghiP	0.179	0.059
IcdP	0.003	0.009
DahA	0.284	0.001

PAHs	3.29	1.13

No similar studies have been conducted in this field, thus a comparison of these data to previous ones is not possible. A previous study, conducted with a high volume sampler for collecting gaseous and particulate PAHs shows a lower concentration of PAHs associated to particulate matter in 2012 (from 0.12 to 1.0 ng/m^3 in 2012[4]), with respect to this work.

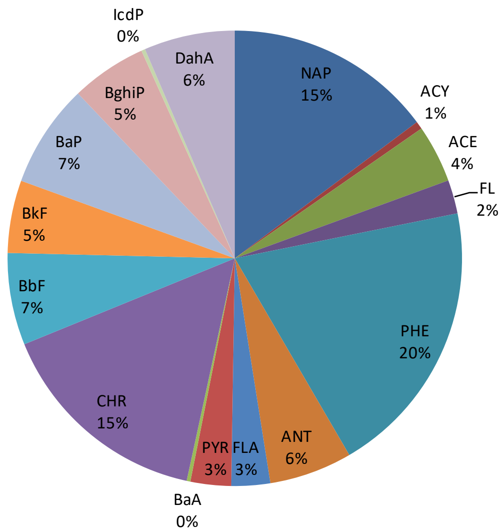

Figure 6.1. Average distribution of PAHs in total suspended particulate matter.

As shown in Figure 6.1, the most present PAHs are PHE (20% of total PAHs), NAP (15% of total PAHs) and CHR (15% of total PAHs).

Size distribution of PAHs

The size distribution of PAHs have been investigated using data of sample 20, collected in the week 23-30 April 2019, since it is the only one for which information of all stages is available. The size distribution of total PAHs, calculated as the sum of all congeners (Figure 6.2), is trimodal: there is a little peak of concentration at 5.6-3.2 µm and larger peaks of concentration at 0.56-0.32 µm and 0.10-0.056 µm. Globally PAHs are mainly distributed into fine particles (68% of total stages). The PAHs profile is quite different comparing coarse, fine and ultrafine particles (Figure 6.3): coarse particles seems to be more constituted by FL and PHE, representing together almost 80% of total PAHs; the fine fraction is

[4] Gregoris et al., Science of the Total Environment 476-477 (2014) 393-405.

characterised by a various profile, with PHE, ACE, FLA, PYR as main constituents; the ultrafine fraction seems to be mainly constituted of NAP (almost 70% of total PAHs in the fine fraction).

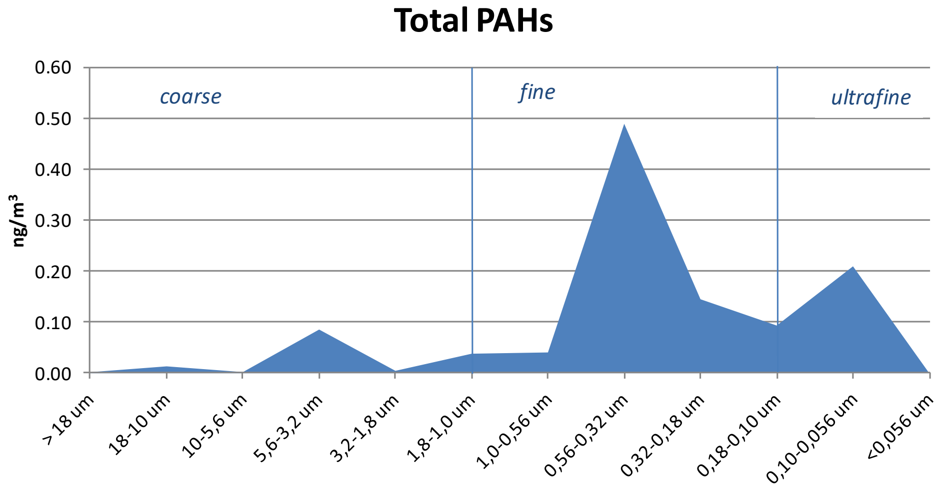

Figure 6.2. Size distribution of total PAHs in the week 23-30 April 2019.

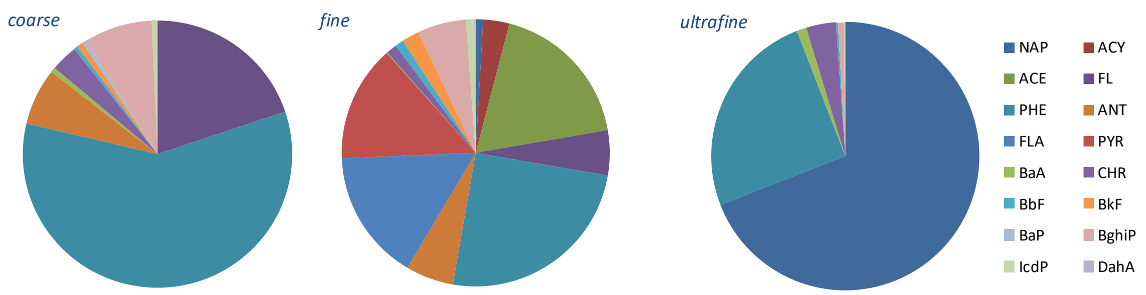

Figure 6.3. PAHs profile of coarse, fine and ultrafine particles, in the week 23-30 April 2019.

This assessment is a preliminary evaluation of the size distribution of PAHs, that should be confirmed with a higher number of samples. The limit of this assessment is due to the low concentration of PAHs in air. The specific configuration of the sampling, consisting in dividing the airborne particles into twelve different filters, means that the deposited material per filter is very little. With so many concentration values below the detection limit all the calculations and the resulting discussion have to be used with caution. Further analysis in this topic are needed.

PART II

High temporal resolution measurements

7. MEASUREMENT CAMPAIGN

The high-temporal resolution measurements have been taken at the monitoring station of the Protection and Prevention Agency of Veneto region (ARPAV) in Sacca Fisola, Venice (45°25’40.14’’ N; 12°18’36.73’’ E).

Figure 7.1. Location of the measurement site in Venice.

Figure 7.2. Details of the outdoor cabinet used for high-temporal resolution measurements.

This is the same site in which size-segregated samples were collected for chemical analysis (Fig. 7.1). The site chosen is located in front of the tourist harbour of Venice and It faces the channel that includes the main ship routes (Fig. 7.2). The measurement campaign was performed between 6/9/2018 and 27/11/2018 to collect real-time measurements of meteorological parameters (wind velocity and direction, temperature, and relative humidity) and concentrations of particles of different size ranging from 0.01 to 32 µm.

7.1. Material and methods

The instruments used were located inside and on the roof of an air-conditioned outdoor cabinet (Fig. 7.2). Specifically the instruments (shown in Fig. 7.3) are:

- An ultrasonic anemometer (Gill R3 at 100 Hz) and a thermo-hygrometer Rotronic MP100A (Campbell Scientific) located on the roof of the outdoor cabinet to measure wind velocity, wind direction, temperature, and relative humidity at 1-min resolution.
- A videocamera (analysing two images per minute) was used to individuate the passages of ships synchronising ship traffic information furnished by port authority with concentration measurements.
- A CPC (Grimm 5.403) able to measure the total number of particles, with 1 minute resolution, in the size range between 0.01 – 0.25 µm. Aerosol was sampled through a 70 cm long sampling inlet and a portion of the main flow was injected into the CPC through a 50 cm long conductive silicon tube and a diffusion dryer (silica gel cartridges) to reduce water vapour concentration before the CPC measurement.
- An OPC (Grimm 11-A) able to measure particle number size distributions in the size range 0.25-31 µm in 31 size channels. It uses the same inlet as the CPC and it was operated with 1-min time resolution. The internal software is also able to reconstruct mass size distributions as well as PM_1, $PM_{2.5}$, and PM_{10} mass concentrations.

Figure 7.3. Instruments installed in the outdoor cabinet.

7.2. Results and discussion

Collected data have been analysed using different averaging time: 5, 30, 60 minutes and daily to investigate different aspects related to variability of concentrations and meteorological variables.

Meteorology during the campaign

Daily patterns of temperature, relative humidity, and wind velocity during the measurement campaign are reported in Fig. 7.4. Relative humidity was relatively high being lower than 70% only in diurnal hours between 10:00 and 17:00. Wind velocity was quite low, on average, with no evident diurnal patter. Figure 7.5 shows the windrose for the whole campaign obtained from hourly data. It shows a dominant wind direction from NE (mainly present during the night and the first hours of the day) and a second wind direction from SE. This is a typical circulation for the Venice area observed also in other measurement campaigns.

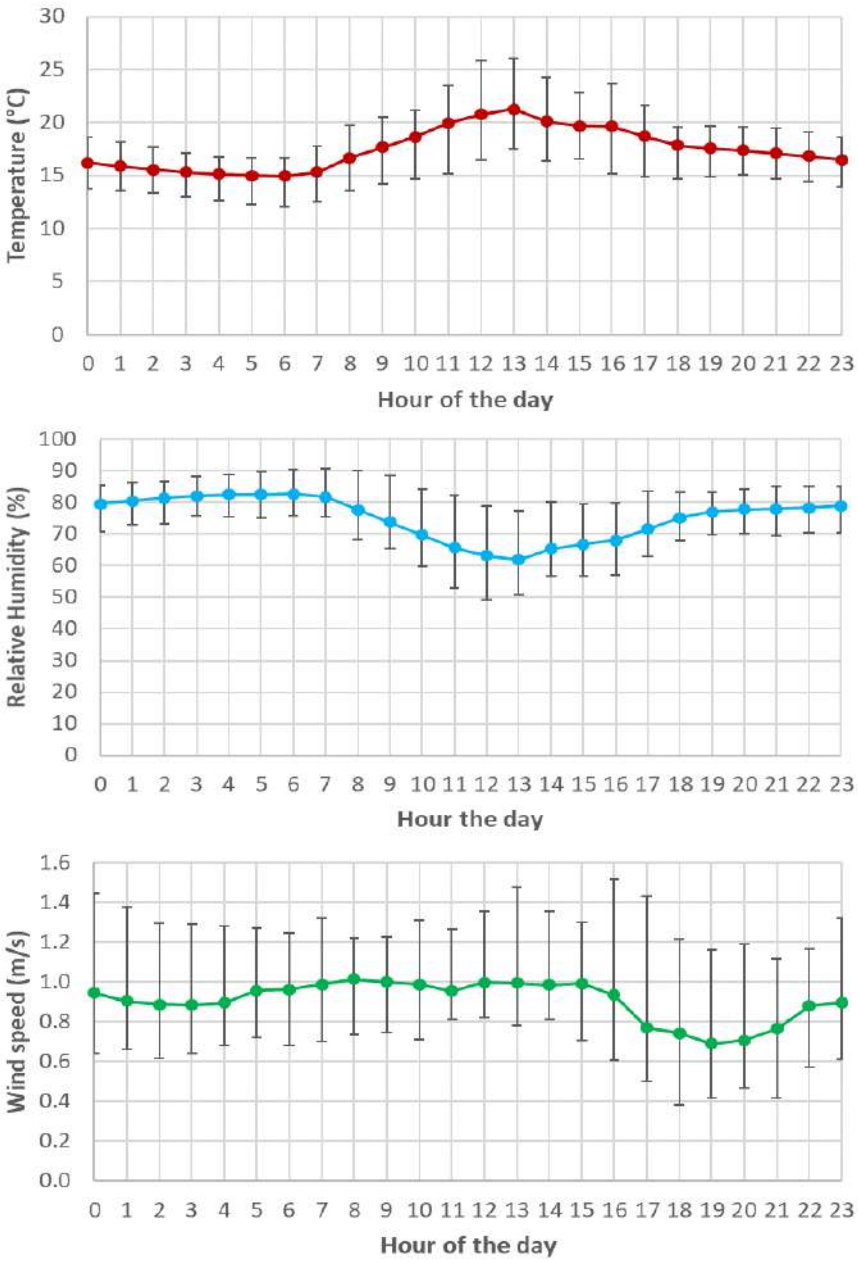

Figure 7.4. Daily pattern of the main meteorological parameters (with interquartile ranges indicated by the error bars).

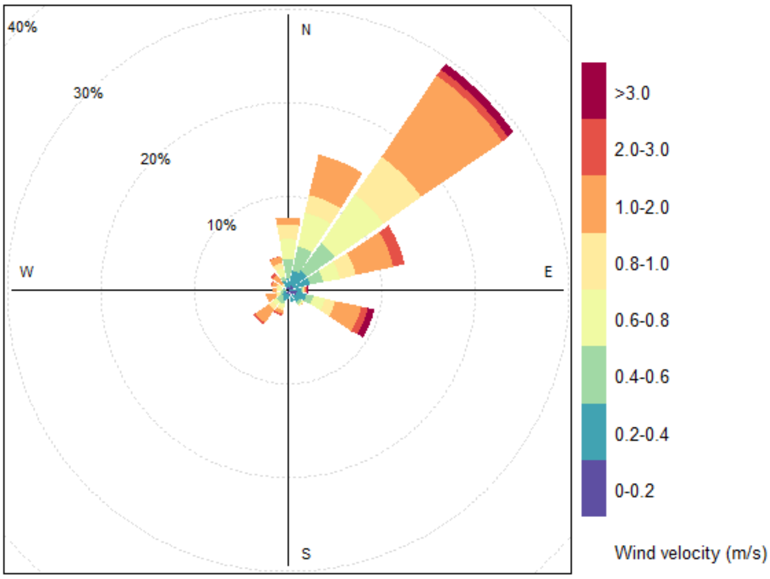

Figure 7.5. Wind rose of the Venice campaign.

Particle number concentrations and size distributions

Daily PM_{10} concentrations measured by the OPC are compared with Arpa Veneto results for the two stations of Sacca Fisola and Parco Bissuola are compared in Fig. 7.6. In general terms there is a good correlation between the time series with some of the days having PM_{10} concentrations larger than the daily legislation threshold (50 μg/m^3). The average PM_{10} observed during the campaign was 28.9 μg/m^3, the average $PM_{2.5}$ was 24.8 μg/m^3, and the average PM_1 was 21.8 μg/m^3. The average size distributions in number and in mass obtained combining the measurements of the CPC and of the OPC are reported in Fig. 7.7. It is possible to individuate three size ranges likely influenced by different sources and processes:

- Nanoparticles (D< 0.25 μm)
- Fine particles (0.25<D<1 μm)
- Coarse particles (D>1 μm)

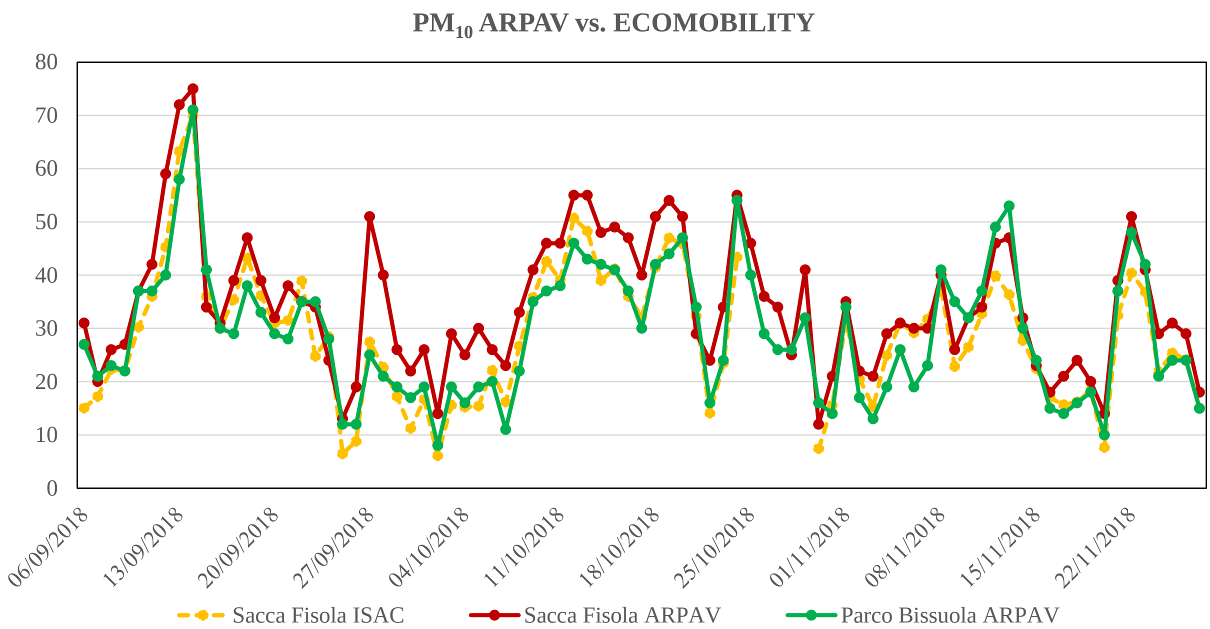

Figure 7.6. Comparison of daily PM10 measured by the OPC with results of Arpa Veneto at two stations: Sacca Fisola and Parco Bissuola.

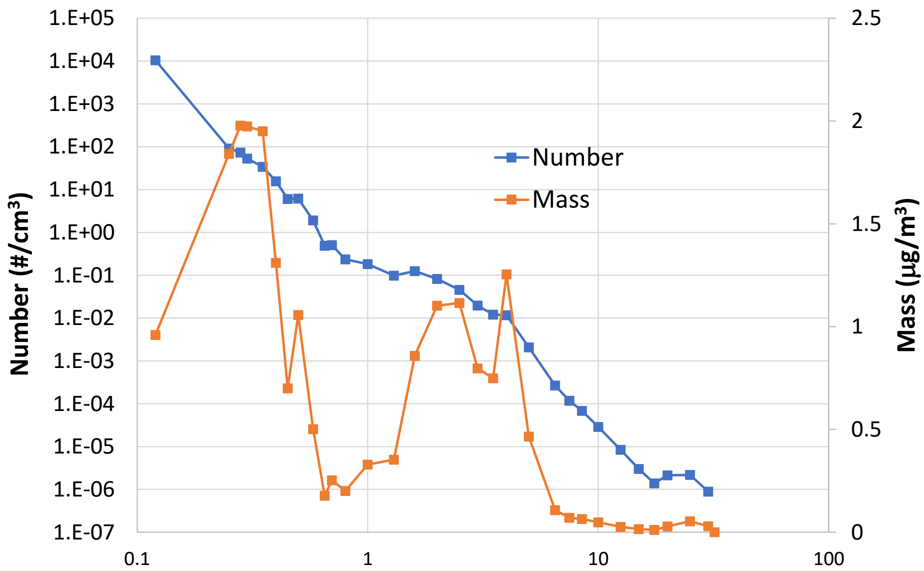

Figure 7.7. Average particle size distribution in number and in mass.

The daily pattern of nanoparticle concentration in number is compared to the pattern of number concentrations of larger particles (D>0.25 µm) in Fig. 7.8. Nanoparticle concentrations has a pattern completely different from that of larger particles showing a large peak during morning hours (likely related to the emissions of pollution sources) and a slow increase during the night that could be due to the effect of the growth of the stable boundary-layer. The pattern of larger particles is completely different and it shows a decrease starting early in the morning with a minimum in the early afternoon and a slow increase during the night. This trend is compatible with that expected in an urban background site influenced by the modulation due to the atmospheric stability and boundary-layer height. Weekly patterns for number concentrations in the same size ranges are also reported in Fig. 7.8. These patterns are actually comparable with a maximum in the middle of the weak.

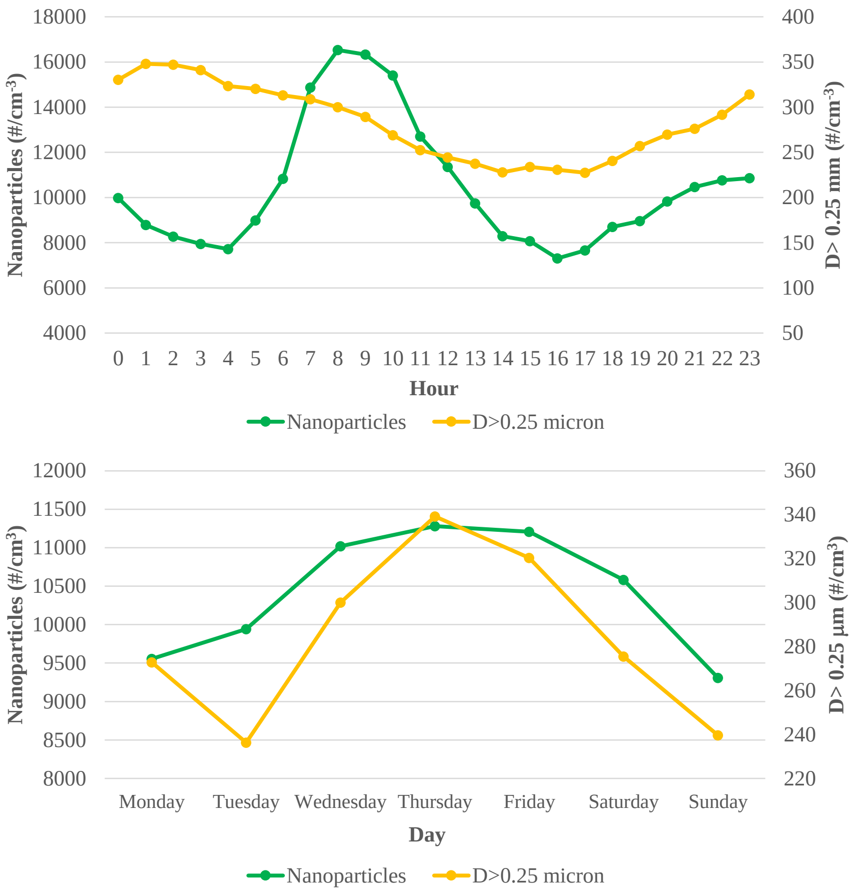

Figure 7.8. Average daily patterns of number concentrations (top) and weekly pattern (bottom) for nanoparticles and larger particles.

The daily patterns of mass concentrations for PM_1 and for coarse particles (PM_{10-1}) are reported in Fig. 7.9. The pattern of PM_1 is comparable with that in number for large particles and it follows the trend expected for an urban background site influenced by local micrometeorology. Instead, the pattern for mass concentration of coarse particles is completely different with two diurnal maxima one in the morning and the second in the late afternoon. Weekly patterns for mass concentrations in the same size ranges are also reported in Fig. 7.9 showing similar trend for the two size ranges with maximum found in the middle of the week.

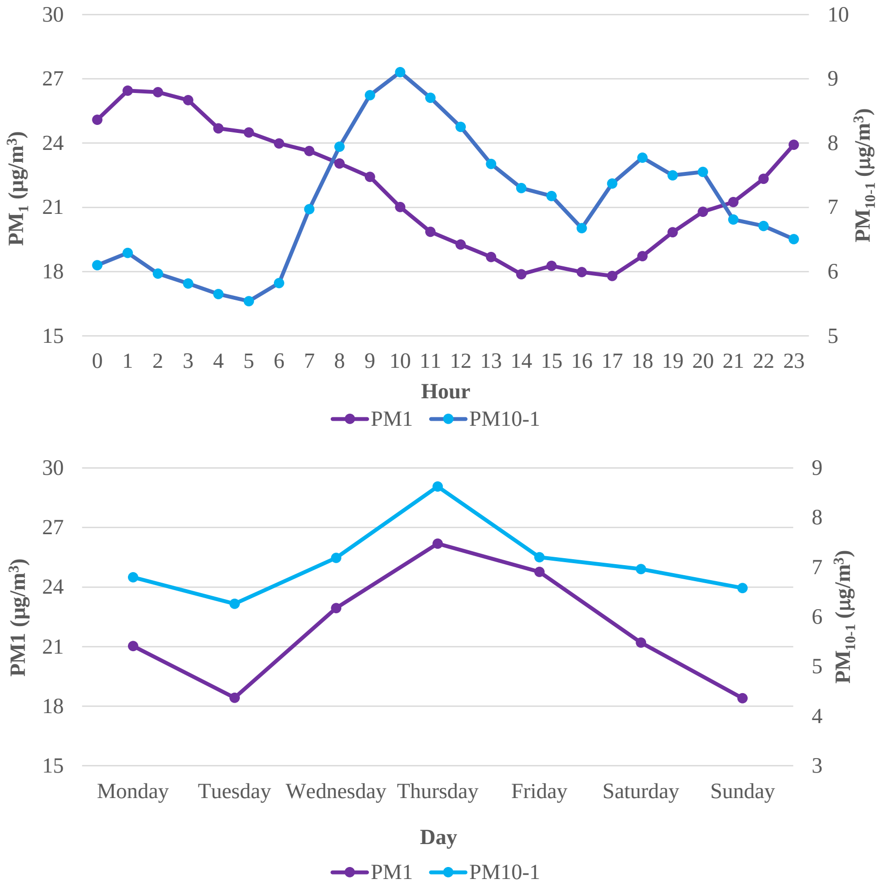

Figure 7.9. Average daily patterns of mass concentrations (top) and weekly pattern (bottom) for PM_{10} and PM_{10-1}.

ANNEX

Detailed concentration data

Table A1.
Particulate concentration data (ug/m3).

	PM
S01IF	0.96
S01St01	1.87
S01St02	5.71
S01St03	5.91
S01St04	2.90
S01St05	1.61
S01St06	3.06
S01St07	3.79
S01St08	2.57
S01St09	1.47
S01St10	0.40
S01BF	2.25
S01	*32.5*
S02IF	1.79
S02St01	2.19
S02St02	4.24
S02St03	5.19
S02St04	3.03
S02St05	2.52
S02St06	4.04
S02St07	2.87
S02St08	1.95
S02St09	1.17
S02St10	ND
S02BF	0.84
S02	*29.8*
S03IF	1.73
S03St01	3.96
S03St02	7.85
S03St03	6.32
S03St04	2.13
S03St05	2.34
S03St06	3.11
S03St07	3.63
S03St08	2.72
S03St09	1.43
S03St10	0.27
S03BF	0.96
S03	*36.5*
S04IF	2.35
S04St01	2.96
S04St02	6.30
S04St03	5.25
S04St04	2.51
S04St05	1.96
S04St06	3.04
S04St07	2.71
S04St08	1.91
S04St09	0.96
S04St10	0.53
S04BF	0.85
S04	*31.3*

	PM
S05IF	ND
S05St01	2.04
S05St02	3.57
S05St03	3.26
S05St04	ND
S05St05	1.77
S05St06	2.97
S05St07	2.63
S05St08	2.45
S05St09	0.31
S05St10	ND
S05BF	ND
S05	*19.0*
S06IF	3.44
S06St01	3.64
S06St02	7.61
S06St03	5.69
S06St04	2.83
S06St05	8.55
S06St06	10.29
S06St07	4.37
S06St08	2.72
S06St09	1.16
S06St10	0.31
S06BF	0.85
S06	*51.5*
S07IF	1.88
S07St01	3.98
S07St02	7.09
S07St03	6.52
S07St04	2.80
S07St05	3.88
S07St06	6.26
S07St07	3.10
S07St08	1.68
S07St09	0.73
S07St10	0.10
S07BF	0.52
S07	*38.5*
S08IF	1.73
S08St01	3.44
S08St02	7.50
S08St03	5.93
S08St04	2.34
S08St05	ND
S08St06	1.73
S08St07	1.63
S08St08	0.90
S08St09	0.84
S08St10	ND
S08BF	0.22
S08	*26.3*

	PM
S09IF	0.65
S09St01	2.67
S09St02	4.43
S09St03	4.30
S09St04	2.17
S09St05	3.04
S09St06	4.35
S09St07	ND
S09St08	1.44
S09St09	1.11
S09St10	0.23
S09BF	0.67
S09	*25.1*
S10IF	3.92
S10St01	2.88
S10St02	6.58
S10St03	7.01
S10St04	2.92
S10St05	5.52
S10St06	9.61
S10St07	3.04
S10St08	4.00
S10St09	1.60
S10St10	0.27
S10BF	ND
S10	*47.3*
S11IF	1.40
S11St01	3.04
S11St02	6.59
S11St03	6.55
S11St04	2.57
S11St05	5.10
S11St06	7.05
S11St07	4.71
S11St08	ND
S11St09	0.71
S11St10	0.12
S11BF	0.36
S11	*38.2*
S12IF	1.65
S12St01	3.23
S12St02	7.44
S12St03	8.71
S12St04	3.82
S12St05	5.44
S12St06	ND
S12St07	1.90
S12St08	1.35
S12St09	0.60
S12St10	ND
S12BF	0.50
S12	*34.6*

	PM
S13IF	1.29
S13St01	2.30
S13St02	4.03
S13St03	6.24
S13St04	3.14
S13St05	3.92
S13St06	3.48
S13St07	1.84
S13St08	1.31
S13St09	0.52
S13St10	0.23
S13BF	0.33
S13	*28.6*
S14IF	1.64
S14St01	2.04
S14St02	4.16
S14St03	4.88
S14St04	4.51
S14St05	12.13
S14St06	9.07
S14St07	3.64
S14St08	2.38
S14St09	0.44
S14St10	0.00
S14BF	0.08
S14	*45.0*
S15IF	1.20
S15St01	1.69
S15St02	4.07
S15St03	4.03
S15St04	2.34
S15St05	2.76
S15St06	5.74
S15St07	4.00
S15St08	9.49
S15St09	0.00
S15St10	0.00
S15BF	0.03
S15	*35.3*
S16IF	0.79
S16St01	1.11
S16St02	1.73
S16St03	2.47
S16St04	ND
S16St05	3.41
S16St06	5.71
S16St07	3.09
S16St08	1.40
S16St09	0.46
S16St10	0.23
S16BF	0.44
S16	*20.8*

IF: inlet filter / BF: backup filter / ND: not detected

Table A2.
Ion concentration data (ng/m3).

	Cl^-	NO_3^-	SO_4^{2-}	MSA^-	Br^-	C_1-formic	C_2-acetic	C_2-glycolic	C_2-oxalic	C_3-malonate	*cis-us* C_4-	*trans-us* C_4-	C_4-succinic
S01IF	129.691	126.047	163.236	0.571	0.436	ND	ND	DET	9.499	2.602	DET	ND	2.857
S01St01	231.017	DET	177.658	0.635	1.106	ND	ND	0.052	10.067	2.512	ND	ND	2.644
S01St02	743.778	204.267	262.631	0.606	3.139	ND	ND	DET	14.442	4.036	ND	ND	1.638
S01St03	442.403	237.322	194.992	0.808	1.537	ND	ND	DET	20.090	6.154	ND	ND	1.340
S01St04	110.736	177.253	171.754	1.284	0.495	ND	ND	DET	28.110	8.479	ND	ND	0.894
S01St05	DET	DET	297.622	2.732	0.171	ND	ND	DET	25.979	5.679	ND	ND	DET
S01St06	ND	DET	813.387	7.031	0.487	ND	ND	DET	29.266	3.806	ND	ND	0.946
S01St07	ND	DET	906.878	8.450	0.610	ND	ND	0.058	29.248	3.810	ND	ND	0.996
S01St08	ND	DET	706.579	6.791	0.457	ND	ND	0.053	27.403	2.976	ND	ND	0.814
S01St09	ND	ND	262.388	2.635	DET	ND	ND	DET	15.913	1.874	ND	ND	DET
S01St10	ND	ND	80.339	0.801	DET	ND	ND	ND	8.806	1.002	ND	ND	DET
S01BF	ND	ND	43.110	0.556	ND	ND	ND	ND	7.737	1.056	ND	ND	DET
S01	*1657.625*	*744.890*	*4080.575*	*32.899*	*8.439*	*NQ*	*NQ*	*0.162*	*226.560*	*43.988*	*NQ*	*NQ*	*12.127*
S02IF	258.321	142.672	224.248	DET	0.775	ND	ND	DET	6.157	2.369	DET	ND	2.346
S02St01	380.812	119.388	206.077	DET	1.427	ND	ND	DET	6.695	2.354	DET	ND	1.813
S02St02	648.007	212.582	238.861	DET	2.423	ND	ND	DET	9.628	3.034	ND	ND	1.133
S02St03	333.158	267.620	179.160	0.593	1.511	ND	ND	DET	14.887	4.959	ND	ND	0.882
S02St04	74.942	217.147	199.803	1.581	0.494	ND	ND	DET	23.619	7.335	ND	ND	DET
S02St05	DET	DET	517.265	4.211	0.369	ND	ND	DET	25.988	3.737	ND	ND	DET
S02St06	ND	109.512	1026.649	9.231	0.599	ND	ND	DET	33.592	3.383	ND	ND	0.773
S02St07	ND	DET	626.263	6.991	0.442	ND	ND	DET	27.003	2.326	ND	ND	DET
S02St08	ND	DET	281.395	3.385	0.301	ND	ND	DET	17.731	1.542	ND	ND	DET
S02St09	ND	ND	116.526	1.747	0.156	ND	ND	ND	11.380	1.108	ND	ND	DET
S02St10	ND	ND	26.296	0.473	DET	ND	ND	ND	4.512	0.521	ND	ND	DET
S02BF	ND	ND	16.952	DET	DET	ND	ND	ND	3.632	0.526	ND	ND	DET
S02	*1695.240*	*1068.922*	*3659.495*	*28.213*	*8.497*	*NQ*	*NQ*	*NQ*	*184.823*	*33.195*	*NQ*	*NQ*	*6.947*
S03IF	191.933	99.560	168.716	DET	0.374	ND	ND	0.051	6.276	2.787	DET	ND	2.121
S03St01	514.430	124.413	226.666	0.466	1.475	ND	ND	0.062	9.331	2.938	ND	ND	1.946
S03St02	945.635	180.566	291.078	DET	2.544	ND	ND	0.055	12.777	4.165	ND	ND	1.165
S03St03	452.515	207.888	176.761	0.511	1.416	ND	ND	DET	18.111	6.491	ND	ND	0.890
S03St04	86.034	146.606	167.444	1.231	0.221	ND	ND	DET	24.338	6.735	ND	ND	DET
S03St05	DET	DET	491.140	4.664	0.387	ND	ND	DET	32.282	4.004	ND	0.004	DET
S03St06	ND	DET	868.531	7.450	0.564	ND	ND	0.071	34.040	3.466	ND	ND	0.886
S03St07	43.834	768.814	336.753	5.138	0.629	ND	ND	DET	33.823	1.762	0.034	ND	0.996
S03St08	ND	DET	435.708	4.054	0.348	ND	ND	DET	23.161	2.327	ND	ND	DET
S03St09	DET	DET	211.692	1.916	0.110	ND	ND	DET	16.491	1.691	ND	ND	DET
S03St10	ND	ND	31.431	DET	ND	ND	ND	ND	5.684	0.486	ND	ND	ND
S03BF	ND	ND	18.715	ND	DET	ND	ND	ND	4.224	0.432	ND	ND	DET
S03	*2234.380*	*1527.847*	*3424.636*	*25.430*	*8.069*	*NQ*	*NQ*	*0.238*	*220.539*	*37.284*	*0.034*	*0.004*	*8.005*

IF: inlet filter / BF: backup filter / ND: not detectedND: not detected / DET: detected / NQ: not quantifiable

Table A2.

Ion concentration data (ng/m3).

	Cl^-	NO_3^-	SO_4^{2-}	MSA$^-$	Br^-	C_1-formic	C_2-acetic	C_2-glycolic	C_2-oxalic	C_3-malonate	*cis-us* C_4-	*trans-us* C_4-	C_4-succinic
S04IF	284.875	123.256	179.822	ND	1.307	ND	ND	DET	5.931	2.365	DET	ND	1.436
S04St01	425.120	DET	160.151	ND	1.775	ND	ND	DET	4.710	1.754	DET	ND	1.131
S04St02	1008.758	219.608	249.875	DET	3.188	ND	ND	DET	9.103	2.805	DET	ND	0.892
S04St03	660.366	312.826	208.601	DET	2.392	ND	ND	DET	15.820	4.808	ND	ND	0.787
S04St04	99.665	141.390	103.045	0.698	0.427	ND	ND	DET	17.439	4.091	ND	ND	DET
S04St05	ND	DET	268.302	3.078	0.292	ND	ND	DET	26.177	2.545	ND	ND	DET
S04St06	ND	155.131	587.089	6.266	0.966	ND	ND	DET	33.480	3.630	ND	ND	DET
S04St07	ND	DET	465.833	5.225	0.426	ND	ND	0.052	28.176	2.851	ND	ND	DET
S04St08	ND	DET	217.682	2.649	0.317	ND	ND	DET	16.037	1.634	ND	ND	DET
S04St09	DET	DET	113.899	1.953	DET	ND	ND	DET	13.280	1.253	ND	ND	ND
S04St10	DET	DET	35.083	0.698	0.163	ND	ND	ND	7.134	0.684	ND	DET	DET
S04BF	ND	ND	19.939	DET	DET	ND	ND	ND	4.090	0.389	ND	ND	DET
S04	*2478.784*	*952.212*	*2609.321*	*20.568*	*11.253*	*NQ*	*NQ*	*0.052*	*181.377*	*28.809*	*NQ*	*NQ*	*4.246*
S05IF	224.300	111.484	139.688	ND	0.894	ND	ND	DET	DET	1.394	DET	ND	DET
S05St01	563.722	111.454	204.242	DET	1.977	ND	ND	DET	3.508	1.519	DET	ND	DET
S05St02	946.192	219.836	254.520	ND	2.893	ND	ND	ND	6.238	2.299	DET	ND	DET
S05St03	329.346	265.225	131.662	DET	1.223	ND	ND	ND	9.469	3.725	DET	ND	DET
S05St04	41.766	178.204	79.607	0.496	0.295	ND	ND	ND	11.959	3.422	ND	ND	ND
S05St05	DET	350.731	264.725	3.875	0.431	ND	ND	DET	28.939	3.893	ND	ND	DET
S05St06	ND	337.975	349.287	5.589	0.546	ND	ND	DET	32.563	4.011	ND	ND	DET
S05St07	ND	137.421	271.375	4.494	0.333	ND	ND	DET	24.594	2.713	ND	ND	DET
S05St08	ND	DET	188.018	3.238	0.226	ND	ND	DET	17.965	1.783	ND	ND	ND
S05St09	ND	DET	83.734	1.522	DET	ND	ND	ND	9.168	0.966	ND	ND	ND
S05St10	ND	ND	19.668	DET	DET	ND	ND	ND	3.860	DET	ND	ND	ND
S05BF	ND	ND	11.527	ND	0.209	ND	ND	ND	4.800	0.584	ND	0.006	DET
S05	*2105.327*	*1712.330*	*1998.054*	*19.212*	*9.027*	*NQ*	*NQ*	*NQ*	*153.063*	*26.310*	*NQ*	*0.006*	*NQ*
S06IF	190.400	240.916	226.753	DET	0.559	ND	ND	DET	5.490	1.770	DET	DET	2.503
S06St01	292.731	345.849	172.685	ND	1.069	ND	ND	DET	4.300	1.720	DET	ND	1.293
S06St02	448.059	819.231	186.317	DET	1.257	ND	ND	ND	6.392	2.559	ND	ND	0.848
S06St03	127.381	646.952	140.035	0.477	0.459	ND	ND	ND	7.640	3.672	ND	ND	0.809
S06St04	DET	476.638	222.604	1.604	0.276	ND	ND	DET	14.090	3.818	DET	ND	0.793
S06St05	ND	2172.230	1407.157	10.799	1.027	ND	ND	DET	46.076	7.221	ND	ND	2.132
S06St06	ND	1606.444	1294.470	10.558	0.802	ND	ND	DET	30.821	6.075	ND	ND	2.298
S06St07	ND	492.385	840.298	7.233	0.456	ND	ND	DET	23.953	3.529	ND	ND	0.977
S06St08	ND	155.175	314.548	3.129	0.193	ND	ND	DET	12.393	1.501	ND	ND	DET
S06St09	ND	110.468	168.752	1.661	0.167	ND	ND	ND	12.136	1.088	ND	ND	ND
S06St10	ND	DET	27.886	DET	DET	ND	ND	ND	4.234	0.379	ND	ND	ND
S06BF	ND	DET	13.743	ND	0.141	ND	ND	ND	3.689	0.415	ND	ND	DET
S06	*1058.570*	*7066.288*	*5015.248*	*35.459*	*6.408*	*NQ*	*NQ*	*NQ*	*171.215*	*33.747*	*NQ*	*NQ*	*11.653*

IF: inlet filter / BF: backup filter / ND: not detectedND: not detected / DET: detected / NQ: not quantifiable

Table A2.
Ion concentration data (ng/m3).

	Cl^-	NO_3^-	SO_4^{2-}	MSA^-	Br^-	C_1-formic	C_2-acetic	C_2-glycolic	C_2-oxalic	C_3-malonate	*cis-us* C_4-	*trans-us* C_4-	C_4-succinic
S07IF	204.415	170.889	178.858	DET	0.582	ND	ND	DET	4.557	1.229	DET	ND	1.159
S07St01	398.256	274.583	222.106	DET	1.470	ND	ND	DET	5.850	1.736	DET	DET	1.300
S07St02	795.966	781.834	289.576	0.667	2.171	ND	ND	DET	11.005	3.914	DET	0.005	1.368
S07St03	256.090	626.933	210.700	0.982	0.936	ND	ND	DET	16.330	5.370	DET	DET	1.211
S07St04	44.903	431.915	347.891	2.892	0.287	ND	ND	DET	23.604	6.078	DET	ND	0.912
S07St05	ND	360.049	908.232	6.246	0.393	ND	ND	DET	30.523	3.768	ND	ND	0.807
S07St06	ND	529.202	2131.740	13.653	0.936	ND	ND	DET	41.111	4.703	ND	ND	1.292
S07St07	ND	181.481	848.903	6.372	0.348	ND	ND	DET	28.302	2.325	ND	ND	DET
S07St08	ND	96.564	447.302	3.853	0.226	ND	ND	DET	21.099	1.453	ND	ND	DET
S07St09	ND	DET	132.740	1.408	0.145	ND	ND	ND	9.407	0.755	DET	ND	DET
S07St10	ND	DET	16.110	DET	0.106	ND	ND	ND	DET	DET	ND	ND	ND
S07BF	ND	DET	17.965	DET	DET	ND	ND	ND	3.920	0.341	ND	ND	DET
S07	*1699.631*	*3453.449*	*5752.123*	*36.074*	*7.600*	*NQ*	*NQ*	*NQ*	*195.709*	*31.671*	*NQ*	*0.005*	*8.050*
S08IF	292.516	DET	173.309	DET	1.002	ND	ND	DET	3.911	0.889	DET	ND	DET
S08St01	548.877	DET	194.965	DET	1.537	ND	ND	ND	3.652	0.802	DET	ND	DET
S08St02	1239.170	280.700	323.777	DET	2.516	ND	ND	DET	6.377	1.541	DET	ND	DET
S08St03	578.768	441.492	199.169	0.376	1.447	ND	ND	DET	7.821	2.742	DET	ND	DET
S08St04	86.325	310.358	110.477	0.636	0.357	ND	ND	ND	8.034	3.378	DET	ND	DET
S08St05	DET	253.947	181.422	2.747	0.290	ND	ND	DET	13.080	2.727	DET	ND	DET
S08St06	DET	230.721	297.854	5.145	0.377	ND	ND	DET	17.187	1.637	DET	ND	DET
S08St07	ND	128.663	247.043	4.828	0.333	ND	ND	DET	15.724	1.174	DET	ND	DET
S08St08	ND	DET	135.365	2.997	0.212	ND	ND	DET	10.580	0.752	ND	ND	ND
S08St09	ND	DET	68.370	1.783	0.313	ND	ND	ND	6.577	0.497	ND	ND	ND
S08St10	ND	ND	18.278	0.435	DET	ND	ND	ND	DET	DET	ND	ND	ND
S08BF	ND	ND	14.834	DET	0.107	ND	ND	ND	2.846	DET	ND	ND	ND
S08	*2745.656*	*1645.881*	*1964.865*	*18.949*	*8.491*	*NQ*	*NQ*	*NQ*	*95.788*	*16.139*	*NQ*	*NQ*	*NQ*
S09IF	272.728	DET	207.059	DET	1.157	ND	ND	ND	DET	0.521	DET	ND	DET
S09St01	589.678	DET	242.828	ND	1.939	ND	ND	ND	DET	0.486	DET	ND	ND
S09St02	1183.782	232.384	336.356	ND	2.504	ND	ND	ND	3.825	0.855	DET	ND	ND
S09St03	603.115	483.278	263.993	DET	1.752	ND	ND	ND	7.961	2.314	DET	ND	DET
S09St04	77.301	364.227	188.057	0.676	0.240	ND	ND	DET	10.848	3.012	DET	ND	ND
S09St05	30.407	529.075	385.441	2.686	0.262	ND	ND	ND	17.531	2.534	DET	ND	DET
S09St06	28.626	609.547	622.847	5.339	0.490	ND	ND	DET	27.032	2.742	DET	ND	0.807
S09St07	DET	264.234	418.391	3.574	0.297	ND	ND	DET	21.833	1.700	DET	ND	DET
S09St08	DET	97.254	199.648	1.615	0.146	ND	ND	DET	12.615	0.867	DET	ND	ND
S09St09	ND	DET	91.782	0.654	0.117	ND	ND	ND	6.676	0.449	DET	ND	ND
S09St10	ND	DET	21.824	ND	0.118	ND	ND	ND	DET	DET	ND	ND	ND
S09BF	ND	ND	17.304	ND	0.145	ND	ND	ND	DET	DET	DET	ND	ND
S09	*2785.636*	*2579.998*	*2995.532*	*14.544*	*9.167*	*NQ*	*NQ*	*NQ*	*108.321*	*15.480*	*NQ*	*NQ*	*0.807*

IF: inlet filter / BF: backup filter / ND: not detectedND: not detected / DET: detected / NQ: not quantifiable

Table A2.

Ion concentration data (ng/m3).

	Cl^-	NO_3^-	SO_4^{2-}	MSA^-	Br^-	C_1-formic	C_2-acetic	C_2-glycolic	C_2-oxalic	C_3-malonate	*cis-us* C_4-	*trans-us* C_4-	C_4-succinic
S10IF	211.491	220.628	255.210	ND	1.504	ND	ND	DET	6.281	0.952	0.050	ND	1.434
S10St01	447.581	103.417	261.116	DET	2.665	ND	ND	DET	6.930	1.243	0.042	ND	0.931
S10St02	1133.517	417.621	398.307	DET	4.170	ND	ND	DET	12.437	3.167	0.036	ND	1.257
S10St03	355.676	432.046	256.481	DET	1.654	ND	ND	DET	16.171	4.931	0.030	ND	0.977
S10St04	56.056	288.796	311.865	0.886	0.437	ND	ND	DET	21.490	5.587	0.033	ND	0.673
S10St05	DET	393.895	1202.067	4.312	0.618	ND	ND	0.065	37.779	4.543	DET	ND	1.200
S10St06	DET	683.528	2298.231	7.815	1.223	ND	ND	0.107	50.539	5.123	DET	ND	1.613
S10St07	DET	389.643	1290.155	5.587	0.974	ND	ND	0.101	37.644	3.539	DET	ND	1.131
S10St08	DET	193.048	682.712	3.296	0.470	ND	ND	0.078	26.609	2.131	DET	ND	0.727
S10St09	ND	DET	195.143	0.954	0.199	ND	ND	DET	11.854	1.024	DET	ND	DET
S10St10	ND	ND	28.237	ND	DET	ND	ND	ND	2.772	DET	DET	ND	ND
S10BF	ND	ND	19.720	ND	0.169	ND	ND	ND	3.433	0.403	0.033	ND	DET
S10	*2204.322*	*3122.623*	*7199.244*	*22.851*	*14.082*	*NQ*	*NQ*	*0.351*	*233.938*	*32.644*	*0.224*	*NQ*	*9.943*
S11IF	263.460	DET	115.091	ND	0.908	ND	ND	ND	2.638	0.341	DET	ND	ND
S11St01	480.972	DET	170.913	ND	1.564	ND	ND	ND	3.817	0.592	DET	ND	DET
S11St02	1250.136	389.823	363.773	DET	2.550	ND	ND	DET	10.086	1.816	DET	ND	DET
S11St03	593.613	646.431	271.693	0.654	1.450	ND	ND	DET	11.170	4.414	DET	ND	0.763
S11St04	30.723	186.478	147.551	0.635	0.240	ND	ND	ND	9.715	2.716	DET	ND	ND
S11St05	DET	533.882	994.772	4.397	0.455	ND	ND	DET	28.464	3.241	DET	ND	1.180
S11St06	DET	754.756	1504.898	6.461	0.825	ND	ND	0.065	37.138	3.645	DET	ND	1.370
S11St07	ND	310.091	775.636	4.163	0.420	ND	ND	DET	25.091	2.191	DET	ND	0.909
S11St08	ND	88.727	300.024	2.148	0.179	ND	ND	DET	15.020	1.071	DET	ND	DET
S11St09	ND	DET	74.660	0.885	DET	ND	ND	ND	5.386	0.429	DET	ND	ND
S11St10	ND	ND	17.094	DET	ND	ND	ND	ND	DET	DET	DET	ND	ND
S11BF	ND	ND	16.873	DET	ND	ND	ND	ND	DET	DET	DET	ND	ND
S11	*2618.904*	*2910.186*	*4752.978*	*19.343*	*8.591*	*NQ*	*NQ*	*0.065*	*148.525*	*20.455*	*NQ*	*NQ*	*4.222*
S12IF	445.490	DET	142.889	ND	1.386	ND	ND	ND	3.188	0.337	DET	ND	ND
S12St01	846.872	132.796	236.849	ND	2.207	ND	ND	ND	4.173	0.755	DET	ND	DET
S12St02	1782.847	504.657	380.085	DET	3.121	ND	ND	ND	8.147	1.507	DET	ND	DET
S12St03	1282.875	716.594	293.696	1.091	2.371	ND	ND	ND	9.376	2.504	DET	ND	DET
S12St04	559.261	728.537	266.275	2.086	0.838	ND	ND	ND	13.511	2.643	DET	ND	DET
S12St05	114.107	1717.517	521.154	6.006	0.559	ND	ND	ND	28.684	2.560	ND	ND	DET
S12St06	DET	1098.084	428.148	5.929	0.493	ND	ND	ND	23.660	1.135	ND	ND	DET
S12St07	ND	332.936	253.834	4.936	0.331	ND	ND	ND	18.709	0.727	ND	ND	ND
S12St08	ND	223.594	153.024	3.097	0.194	ND	ND	ND	14.322	0.735	DET	ND	ND
S12St09	ND	DET	30.547	0.697	DET	ND	ND	ND	5.030	0.303	DET	ND	ND
S12St10	ND	ND	8.833	ND	DET	ND	ND	ND	DET	DET	DET	ND	ND
S12BF	ND	ND	6.061	ND	0.116	ND	ND	ND	3.009	DET	DET	ND	ND
S12	*5031.452*	*5454.714*	*2721.394*	*23.843*	*11.616*	*NQ*	*NQ*	*NQ*	*131.809*	*13.206*	*NQ*	*NQ*	*NQ*

IF: inlet filter / BF: backup filter / ND: not detectedND: not detected / DET: detected / NQ: not quantifiable

Table A2.
Ion concentration data (ng/m3).

	Cl^-	NO_3^-	SO_4^{2-}	MSA^-	Br^-	C_1-formic	C_2-acetic	C_2-glycolic	C_2-oxalic	C_3-malonate	*cis-us* C_4-	*trans-us* C_4-	C_4-succinic
S13IF	378.348	84.667	138.450	ND	1.285	ND	ND	ND	DET	DET	DET	ND	ND
S13St01	613.454	87.952	167.260	ND	1.683	ND	ND	ND	DET	0.286	DET	ND	ND
S13St02	958.321	250.159	244.713	ND	1.961	ND	ND	ND	3.509	0.451	DET	ND	ND
S13St03	711.556	612.568	240.174	0.721	1.308	ND	ND	ND	8.731	1.418	DET	ND	ND
S13St04	139.160	313.204	183.781	0.946	0.238	ND	ND	ND	10.302	1.898	DET	ND	ND
S13St05	65.036	459.287	690.111	4.339	0.541	ND	ND	ND	24.078	2.030	DET	ND	0.684
S13St06	33.286	381.242	583.991	4.423	0.509	ND	ND	DET	20.931	1.010	DET	ND	DET
S13St07	DET	160.529	225.861	2.250	0.242	ND	ND	ND	17.497	0.628	DET	ND	ND
S13St08	DET	98.456	107.779	1.151	0.212	ND	ND	ND	12.531	0.401	DET	ND	ND
S13St09	ND	ND	21.656	DET	DET	ND	ND	ND	5.001	DET	DET	ND	ND
S13St10	ND	ND	6.771	ND	DET	ND	ND	ND	DET	DET	DET	ND	ND
S13BF	ND	ND	6.116	ND	DET	ND	ND	ND	DET	DET	0.053	ND	ND
S13	*2899.161*	*2448.064*	*2616.662*	*13.829*	*7.979*	*NQ*	*NQ*	*NQ*	*102.581*	*8.122*	*0.053*	*NQ*	*0.684*
S14IF	67.792	DET	65.913	ND	DET	ND	ND	ND	DET	DET	ND	ND	ND
S14St01	190.518	166.900	102.106	ND	0.350	ND	ND	ND	DET	0.425	ND	ND	ND
S14St02	291.129	521.093	152.968	DET	0.674	ND	ND	ND	5.297	1.126	ND	ND	ND
S14St03	126.233	888.875	209.812	0.982	0.206	ND	ND	ND	10.510	1.999	DET	ND	DET
S14St04	45.403	1221.985	420.822	2.190	0.180	ND	ND	ND	12.417	1.781	DET	ND	1.026
S14St05	138.587	4761.720	1838.953	9.704	1.093	ND	ND	DET	42.241	4.624	DET	ND	3.610
S14St06	97.976	2710.390	1169.754	8.697	0.973	ND	ND	DET	38.045	3.148	DET	ND	2.496
S14St07	ND	DET	690.278	4.711	0.237	ND	ND	DET	21.238	2.215	ND	ND	DET
S14St08	26.752	251.702	113.220	1.745	DET	ND	ND	DET	12.416	0.531	0.039	ND	ND
S14St09	ND	DET	17.005	DET	DET	ND	ND	ND	3.375	DET	0.040	ND	ND
S14St10	ND	ND	6.102	ND	DET	ND	ND	ND	DET	DET	0.046	ND	ND
S14BF	ND	ND	4.854	ND	ND	ND	ND	ND	DET	DET	0.072	ND	DET
S14	*984.391*	*10522.666*	*4791.787*	*28.029*	*3.713*	*NQ*	*NQ*	*NQ*	*145.539*	*15.850*	*0.197*	*NQ*	*7.132*
S15IF	199.711	ND	74.043	ND	0.457	ND	ND	ND	DET	ND	DET	ND	ND
S15St01	350.612	ND	106.263	ND	0.902	ND	ND	ND	DET	DET	DET	ND	ND
S15St02	732.544	88.620	195.234	ND	1.532	ND	ND	ND	2.926	0.286	DET	ND	ND
S15St03	389.475	216.656	151.120	DET	0.895	ND	ND	ND	4.444	0.572	DET	ND	ND
S15St04	43.497	177.637	97.597	DET	0.333	ND	ND	ND	4.559	0.623	DET	ND	ND
S15St05	25.944	501.194	388.894	2.019	0.576	ND	ND	ND	12.823	0.923	DET	ND	DET
S15St06	83.970	1130.999	778.506	4.687	0.919	ND	ND	DET	23.177	1.468	DET	ND	1.335
S15St07	22.627	449.760	324.581	2.716	0.351	ND	ND	DET	14.595	0.753	DET	ND	DET
S15St08	20.877	200.581	139.630	1.434	0.107	ND	ND	ND	8.806	0.523	DET	ND	ND
S15St09	DET	DET	49.066	0.519	ND	ND	ND	ND	3.402	DET	DET	ND	ND
S15St10	ND	ND	10.920	ND	ND	ND	ND	ND	ND	ND	DET	ND	ND
S15BF	ND	ND	9.837	ND	ND	ND	ND	ND	ND	ND	DET	ND	ND
S15	*1869.257*	*2765.448*	*2325.690*	*11.375*	*6.073*	*NQ*	*NQ*	*NQ*	*74.732*	*5.148*	*NQ*	*NQ*	*1.335*

IF: inlet filter / BF: backup filter / ND: not detectedND: not detected / DET: detected / NQ: not quantifiable

Table A2.
Ion concentration data (ng/m3).

	Cl^-	NO_3^-	SO_4^{2-}	MSA^-	Br^-	C_1-formic	C_2-acetic	C_2-glycolic	C_2-oxalic	C_3-malonate	*cis-us* C_4-	*trans-us* C_4-	C_4-succinic
S16IF	234.788	DET	98.399	ND	0.692	ND	ND	ND	DET	ND	DET	ND	ND
S16St01	299.543	ND	110.452	ND	0.863	ND	ND	ND	DET	DET	DET	ND	ND
S16St02	514.821	DET	188.349	ND	1.408	ND	ND	ND	4.435	0.409	DET	ND	ND
S16St03	238.730	241.103	163.533	DET	0.866	ND	ND	ND	7.748	0.805	DET	ND	ND
S16St04	35.376	258.273	109.550	DET	0.310	ND	ND	ND	7.612	0.602	DET	ND	ND
S16St05	46.633	1353.009	495.264	3.361	0.563	ND	ND	ND	22.784	1.156	DET	ND	1.015
S16St06	67.061	2034.175	619.087	6.388	0.751	ND	ND	ND	30.447	1.244	ND	ND	1.608
S16St07	DET	767.231	204.174	3.174	0.264	ND	ND	ND	16.827	0.625	DET	ND	DET
S16St08	ND	283.584	88.988	1.704	0.137	ND	ND	ND	8.626	DET	DET	ND	ND
S16St09	ND	ND	26.948	ND	ND	ND	ND	ND	DET	ND	DET	ND	ND
S16St10	ND	ND	9.286	ND	ND	ND	ND	ND	ND	ND	DET	ND	ND
S16BF	ND	ND	17.247	ND	ND	ND	ND	ND	DET	ND	DET	ND	ND
S16	*1436.953*	*4937.376*	*2131.276*	*14.628*	*5.854*	*NQ*	*NQ*	*NQ*	*98.479*	*4.841*	*NQ*	*NQ*	*2.623*

IF: inlet filter / BF: backup filter / ND: not detectedND: not detected / DET: detected / NQ: not quantifiable

Table A2.
Ion concentration data (ng/m3).

	C_5-glutaric	*h* C_4-maleic	C_6-adipic	C_7-pimelic	Na^+	NH_4^+	K^+	Mg^{2+}	Ca^{2+}
S01IF	ND	0.859	ND	ND	DET	ND	ND	DET	ND
S01St01	DET	0.815	ND	ND	127.224	ND	DET	18.719	DET
S01St02	ND	1.461	ND	DET	407.369	ND	21.488	52.838	DET
S01St03	ND	1.837	ND	ND	251.851	ND	16.084	34.256	DET
S01St04	ND	2.497	ND	ND	DET	ND	DET	DET	DET
S01St05	ND	4.173	ND	ND	ND	37.494	DET	DET	ND
S01St06	ND	10.501	ND	ND	ND	183.842	DET	ND	ND
S01St07	ND	11.347	ND	ND	ND	223.125	15.252	ND	ND
S01St08	ND	9.626	ND	ND	DET	179.423	DET	ND	ND
S01St09	DET	3.860	ND	DET	ND	74.481	ND	ND	ND
S01St10	DET	1.607	ND	DET	ND	DET	ND	ND	ND
S01BF	0.008	1.307	DET	DET	ND	ND	ND	ND	ND
S01	*0.008*	*49.892*	*NQ*	*NQ*	*786.444*	*698.366*	*52.824*	*105.813*	*NQ*
S02IF	DET	0.854	ND	ND	216.186	ND	ND	DET	ND
S02St01	ND	0.710	ND	ND	247.041	ND	DET	23.618	DET
S02St02	ND	0.860	ND	ND	469.734	ND	17.880	44.335	DET
S02St03	ND	1.751	ND	ND	246.505	ND	18.718	34.207	DET
S02St04	ND	2.264	ND	ND	80.693	ND	DET	23.464	DET
S02St05	ND	4.128	ND	ND	90.888	72.107	DET	DET	DET
S02St06	ND	9.242	ND	ND	ND	198.834	DET	DET	DET
S02St07	ND	6.261	ND	ND	ND	139.077	DET	ND	ND
S02St08	ND	3.254	ND	ND	ND	68.484	ND	ND	ND
S02St09	ND	1.574	ND	ND	ND	28.225	ND	ND	ND
S02St10	DET	0.493	ND	ND	ND	ND	ND	ND	ND
S02BF	DET	0.424	ND	DET	ND	ND	ND	ND	ND
S02	*NQ*	*31.813*	*NQ*	*NQ*	*1351.046*	*506.727*	*36.598*	*125.625*	*NQ*
S03IF	DET	0.576	ND	ND	DET	ND	ND	DET	DET
S03St01	DET	0.840	ND	ND	393.185	ND	15.083	28.138	DET
S03St02	ND	0.858	ND	ND	612.626	ND	25.887	47.053	DET
S03St03	ND	1.124	ND	ND	264.239	ND	18.685	29.751	DET
S03St04	ND	1.935	ND	DET	126.576	141.045	DET	27.112	3.424
S03St05	ND	6.570	ND	ND	DET	80.838	DET	24.619	DET
S03St06	ND	10.722	ND	ND	97.351	205.395	17.084	DET	DET
S03St07	ND	2.279	DET	DET	ND	250.420	49.497	DET	3.910
S03St08	ND	6.800	ND	ND	ND	110.967	DET	ND	DET
S03St09	ND	3.459	ND	DET	DET	156.807	16.684	ND	DET
S03St10	ND	0.844	ND	ND	ND	DET	ND	ND	ND
S03BF	DET	0.553	ND	DET	ND	ND	ND	ND	ND
S03	*NQ*	*36.561*	*NQ*	*NQ*	*1493.976*	*945.471*	*142.920*	*156.672*	*7.334*

IF: inlet filter / BF: backup filter / ND: not detectedND: not detected / DET: detected / NQ: not quantifiable

Table A2.
Ion concentration data (ng/m3).

	C_5-glutaric	*h* C_4-maleic	C_6-adipic	C_7-pimelic	Na^+	NH_4^+	K^+	Mg^{2+}	Ca^{2+}
S04IF	ND	0.650	ND	ND	197.386	ND	DET	DET	DET
S04St01	ND	0.525	ND	ND	229.815	ND	DET	18.085	DET
S04St02	ND	0.718	ND	ND	681.208	DET	23.960	45.160	DET
S04St03	ND	1.506	ND	ND	373.131	DET	22.735	33.492	DET
S04St04	ND	1.586	ND	ND	DET	ND	DET	DET	ND
S04St05	ND	4.039	ND	ND	ND	39.140	DET	DET	ND
S04St06	ND	8.590	ND	ND	ND	160.247	20.286	DET	DET
S04St07	ND	7.096	ND	ND	DET	96.766	DET	20.329	DET
S04St08	ND	3.521	ND	ND	ND	44.896	DET	DET	ND
S04St09	ND	1.880	ND	DET	ND	137.886	DET	DET	DET
S04St10	ND	0.853	ND	DET	184.048	DET	ND	DET	DET
S04BF	DET	0.434	ND	ND	ND	ND	ND	ND	ND
S04	*NQ*	*31.397*	*NQ*	*NQ*	*1665.588*	*478.935*	*66.982*	*117.065*	*NQ*
S05IF	ND	DET	ND	ND	DET	ND	14.892	DET	DET
S05St01	ND	0.530	ND	ND	505.082	ND	15.334	26.383	ND
S05St02	ND	0.664	ND	ND	596.542	ND	25.058	51.163	DET
S05St03	ND	1.174	ND	ND	315.933	ND	17.986	33.509	ND
S05St04	ND	1.239	ND	ND	ND	ND	DET	19.095	ND
S05St05	ND	5.008	ND	DET	DET	80.395	16.660	DET	DET
S05St06	ND	6.481	ND	ND	ND	133.816	26.384	DET	DET
S05St07	ND	4.199	ND	ND	ND	58.148	DET	ND	ND
S05St08	ND	2.509	ND	ND	ND	45.279	DET	ND	ND
S05St09	ND	0.949	ND	ND	ND	DET	ND	ND	ND
S05St10	ND	DET	ND	ND	DET	ND	ND	ND	ND
S05BF	DET	DET	ND	ND	ND	ND	ND	ND	ND
S05	*NQ*	*22.753*	*NQ*	*NQ*	*1417.557*	*317.638*	*116.314*	*130.150*	*NQ*
S06IF	DET	0.833	ND	ND	152.416	ND	DET	DET	ND
S06St01	DET	0.807	ND	ND	DET	ND	DET	DET	ND
S06St02	DET	0.951	ND	ND	208.033	DET	27.703	28.752	DET
S06St03	DET	1.440	ND	ND	DET	24.825	17.319	DET	ND
S06St04	ND	2.322	ND	ND	DET	38.206	15.242	DET	ND
S06St05	ND	14.197	DET	DET	ND	ND	42.658	19.620	DET
S06St06	ND	13.119	DET	ND	ND	782.458	30.196	ND	DET
S06St07	ND	7.510	DET	ND	ND	269.644	17.734	ND	ND
S06St08	ND	2.104	ND	ND	ND	76.864	DET	ND	ND
S06St09	ND	1.037	ND	ND	ND	41.441	ND	ND	ND
S06St10	ND	DET	ND	DET	ND	ND	ND	ND	ND
S06BF	DET	DET	ND	ND	ND	ND	DET	ND	ND
S06	*NQ*	*44.320*	*NQ*	*NQ*	*360.449*	*1233.437*	*150.851*	*48.372*	*NQ*

IF: inlet filter / BF: backup filter / ND: not detectedND: not detected / DET: detected / NQ: not quantifiable

Table A2.
Ion concentration data (ng/m3).

	C_5-glutaric	*h* C_4-maleic	C_6-adipic	C_7-pimelic	Na^+	NH_4^+	K^+	Mg^{2+}	Ca^{2+}
S07IF	ND	0.991	ND	ND	ND	DET	DET	DET	ND
S07St01	ND	1.218	ND	ND	156.110	ND	16.287	16.062	ND
S07St02	DET	2.772	ND	ND	425.926	DET	44.136	52.127	DET
S07St03	ND	3.237	ND	ND	119.205	27.614	31.929	28.084	DET
S07St04	ND	3.263	ND	ND	ND	37.688	23.154	DET	ND
S07St05	ND	5.908	ND	ND	ND	212.310	19.339	ND	ND
S07St06	ND	12.772	DET	ND	ND	721.423	35.744	ND	ND
S07St07	ND	5.024	ND	ND	ND	241.875	19.339	ND	ND
S07St08	ND	2.518	ND	ND	ND	96.781	DET	ND	ND
S07St09	ND	0.834	ND	ND	DET	31.510	DET	ND	ND
S07St10	ND	DET	ND	ND	ND	ND	DET	ND	ND
S07BF	DET	0.345	ND	DET	ND	74.428	DET	DET	ND
S07	*NQ*	*38.884*	*NQ*	*NQ*	*701.241*	*1443.629*	*189.928*	*96.273*	*NQ*
S08IF	ND	0.447	ND	ND	159.602	ND	DET	18.013	DET
S08St01	ND	0.373	ND	ND	242.872	ND	13.256	18.968	DET
S08St02	ND	0.680	ND	ND	849.140	ND	41.924	78.175	DET
S08St03	ND	0.788	ND	ND	375.813	ND	22.052	40.574	DET
S08St04	ND	0.791	ND	ND	DET	ND	ND	DET	ND
S08St05	ND	1.663	ND	ND	ND	20.911	12.279	DET	DET
S08St06	ND	2.666	ND	ND	ND	59.468	19.120	DET	DET
S08St07	ND	2.204	ND	ND	ND	54.347	15.211	DET	DET
S08St08	ND	1.362	ND	ND	ND	25.445	DET	ND	ND
S08St09	ND	0.815	ND	ND	ND	DET	DET	ND	ND
S08St10	ND	DET	ND	ND	ND	ND	ND	ND	ND
S08BF	ND	DET	ND	ND	ND	ND	ND	ND	ND
S08	*NQ*	*11.790*	*NQ*	*NQ*	*1627.427*	*160.170*	*123.843*	*155.729*	*NQ*
S09IF	ND	DET	ND	ND	187.887	DET	18.994	DET	ND
S09St01	ND	DET	ND	ND	265.658	DET	16.746	24.699	DET
S09St02	ND	DET	ND	ND	723.643	DET	33.981	69.182	DET
S09St03	ND	0.698	ND	ND	437.282	DET	26.862	60.121	DET
S09St04	ND	0.792	ND	ND	113.716	115.266	15.622	23.189	DET
S09St05	ND	2.362	ND	ND	ND	151.078	16.371	DET	DET
S09St06	ND	4.369	ND	DET	ND	290.081	33.981	DET	DET
S09St07	ND	2.811	ND	ND	ND	102.428	18.619	ND	ND
S09St08	ND	1.209	ND	ND	ND	41.372	DET	ND	ND
S09St09	ND	0.347	ND	ND	ND	DET	DET	ND	ND
S09St10	ND	ND	ND	ND	ND	21.754	DET	ND	ND
S09BF	ND	DET	ND	ND	ND	DET	ND	DET	ND
S09	*NQ*	*12.588*	*NQ*	*NQ*	*1728.185*	*721.978*	*181.175*	*177.190*	*NQ*

IF: inlet filter / BF: backup filter / ND: not detectedND: not detected / DET: detected / NQ: not quantifiable

Table A2.

Ion concentration data (ng/m3).

	C_5-glutaric	*h* C_4-maleic	C_6-adipic	C_7-pimelic	Na^+	NH_4^+	K^+	Mg^{2+}	Ca^{2+}
S10IF	DET	0.457	ND	DET	203.070	ND	89.497	DET	ND
S10St01	ND	0.534	ND	ND	249.785	ND	13.674	27.637	DET
S10St02	ND	1.120	ND	ND	793.630	ND	39.432	77.886	3.167
S10St03	ND	1.789	ND	ND	263.265	ND	24.921	47.976	DET
S10St04	ND	1.984	ND	ND	DET	26.976	16.939	20.060	DET
S10St05	ND	7.692	ND	DET	ND	294.820	60.474	14.344	DET
S10St06	ND	13.642	ND	DET	ND	ND	117.069	DET	DET
S10St07	ND	9.125	ND	DET	ND	394.807	78.614	DET	DET
S10St08	ND	5.073	ND	ND	ND	179.075	48.865	DET	DET
S10St09	ND	1.391	ND	ND	ND	55.345	17.302	ND	ND
S10St10	ND	DET	ND	ND	ND	22.962	ND	ND	ND
S10BF	ND	DET	ND	ND	ND	DET	ND	ND	ND
S10	*NQ*	*42.808*	*NQ*	*NQ*	*1509.750*	*973.984*	*506.788*	*187.901*	*3.167*
S11IF	ND	DET	ND	ND	ND	ND	DET	ND	ND
S11St01	ND	0.302	ND	ND	ND	ND	DET	17.953	ND
S11St02	ND	0.809	ND	ND	419.180	DET	37.349	95.430	DET
S11St03	ND	1.440	ND	ND	DET	DET	32.922	66.111	2.922
S11St04	ND	0.825	ND	ND	ND	26.483	12.493	DET	ND
S11St05	ND	6.027	ND	DET	ND	385.078	61.864	18.078	ND
S11St06	ND	9.466	ND	DET	ND	ND	95.912	ND	ND
S11St07	ND	5.479	DET	ND	ND	295.901	58.118	ND	ND
S11St08	ND	1.840	DET	ND	ND	102.986	27.475	ND	ND
S11St09	ND	0.413	ND	ND	ND	26.349	DET	ND	ND
S11St10	ND	DET	ND	ND	ND	DET	ND	ND	ND
S11BF	ND	DET	ND	ND	ND	ND	ND	ND	ND
S11	*NQ*	*26.601*	*NQ*	*NQ*	*419.180*	*836.797*	*326.132*	*197.571*	*2.922*
S12IF	ND	DET	ND	ND	ND	ND	27.910	20.258	ND
S12St01	ND	0.327	ND	ND	476.333	ND	20.366	37.897	ND
S12St02	ND	0.470	ND	ND	781.729	DET	50.902	125.039	DET
S12St03	ND	0.805	ND	ND	483.928	DET	42.639	109.111	DET
S12St04	ND	0.967	ND	ND	DET	55.798	28.270	62.645	ND
S12St05	ND	3.037	DET	ND	ND	476.337	60.961	29.078	ND
S12St06	ND	2.775	ND	ND	ND	373.491	35.814	ND	ND
S12St07	ND	1.299	DET	ND	ND	146.744	27.192	ND	ND
S12St08	ND	0.818	DET	ND	ND	27.381	13.900	ND	ND
S12St09	ND	DET	ND	ND	ND	ND	ND	ND	ND
S12St10	ND	ND	ND	ND	ND	ND	ND	ND	ND
S12BF	ND	DET	ND	ND	ND	ND	DET	ND	ND
S12	*NQ*	*10.498*	*NQ*	*NQ*	*1741.989*	*1079.751*	*307.953*	*384.029*	*NQ*

IF: inlet filter / BF: backup filter / ND: not detectedND: not detected / DET: detected / NQ: not quantifiable

Table A2.
Ion concentration data (ng/m3).

	C_5-glutaric	*h* C_4-maleic	C_6-adipic	C_7-pimelic	Na^+	NH_4^+	K^+	Mg^{2+}	Ca^{2+}
S13IF	ND	DET	ND	ND	106.998	ND	24.495	DET	ND
S13St01	ND	0.290	ND	ND	318.269	ND	18.189	34.877	ND
S13St02	ND	0.358	ND	ND	583.669	ND	26.702	54.170	DET
S13St03	ND	0.421	ND	ND	179.711	22.547	29.540	66.763	DET
S13St04	ND	0.557	ND	ND	ND	47.381	14.091	22.285	ND
S13St05	ND	2.423	DET	ND	ND	185.685	39.944	25.058	DET
S13St06	ND	2.222	DET	ND	ND	165.780	42.151	DET	DET
S13St07	ND	1.102	0.037	ND	ND	41.308	25.126	ND	ND
S13St08	ND	0.547	0.047	ND	ND	26.949	19.451	ND	ND
S13St09	ND	DET	ND	ND	ND	ND	DET	ND	ND
S13St10	ND	ND	ND	ND	ND	ND	ND	ND	ND
S13BF	ND	ND	ND	ND	ND	ND	ND	ND	ND
S13	*NQ*	*7.920*	*0.084*	*NQ*	*1188.647*	*489.649*	*239.688*	*203.153*	*NQ*
S14IF	ND	ND	ND	ND	ND	52.488	DET	ND	ND
S14St01	ND	DET	ND	ND	ND	64.875	DET	DET	DET
S14St02	ND	0.387	ND	ND	ND	38.513	19.495	23.270	DET
S14St03	ND	0.787	ND	ND	ND	159.129	18.043	21.540	DET
S14St04	ND	0.949	ND	ND	ND	375.647	14.049	DET	ND
S14St05	ND	5.393	ND	DET	ND	ND	60.162	31.784	4.496
S14St06	ND	4.614	ND	DET	DET	ND	69.239	17.283	3.858
S14St07	ND	8.249	ND	ND	ND	188.090	16.591	ND	ND
S14St08	ND	0.601	DET	DET	DET	187.702	29.662	DET	DET
S14St09	ND	DET	ND	ND	ND	27.559	ND	ND	ND
S14St10	ND	ND	ND	ND	ND	ND	ND	ND	ND
S14BF	ND	ND	ND	ND	ND	DET	ND	ND	ND
S14	*NQ*	*20.980*	*NQ*	*NQ*	*NQ*	*1094.003*	*227.240*	*93.876*	*8.353*
S15IF	ND	ND	ND	ND	ND	DET	ND	ND	ND
S15St01	ND	ND	ND	ND	ND	ND	DET	DET	ND
S15St02	ND	DET	ND	ND	105.270	ND	17.912	27.229	DET
S15St03	ND	0.360	ND	ND	ND	ND	17.257	28.669	DET
S15St04	ND	DET	ND	ND	ND	56.724	DET	DET	ND
S15St05	ND	1.110	ND	ND	ND	193.806	28.064	DET	ND
S15St06	ND	2.683	ND	0.003	ND	ND	85.049	34.429	6.840
S15St07	ND	1.212	ND	ND	ND	279.316	50.334	DET	DET
S15St08	ND	0.465	ND	DET	ND	180.365	30.684	ND	DET
S15St09	ND	DET	ND	DET	ND	125.291	11.034	ND	ND
S15St10	ND	ND	ND	ND	ND	ND	ND	ND	ND
S15BF	ND	ND	ND	ND	ND	ND	ND	ND	ND
S15	*NQ*	*5.831*	*NQ*	*0.003*	*105.270*	*835.502*	*240.334*	*90.326*	*6.840*

IF: inlet filter / BF: backup filter / ND: not detectedND: not detected / DET: detected / NQ: not quantifiable

Table A2.
Ion concentration data (ng/m3).

	C_5-glutaric	*h* C_4-maleic	C_6-adipic	C_7-pimelic	Na^+	NH_4^+	K^+	Mg^{2+}	Ca^{2+}
S16IF	ND	ND	ND	ND	ND	ND	33.143	ND	ND
S16St01	ND	ND	ND	ND	ND	ND	DET	ND	ND
S16St02	ND	DET	ND	ND	ND	ND	16.743	30.391	ND
S16St03	ND	0.725	ND	ND	ND	28.574	DET	26.932	ND
S16St04	ND	DET	ND	ND	ND	40.738	DET	DET	ND
S16St05	ND	1.964	ND	ND	ND	427.246	51.530	DET	ND
S16St06	ND	2.800	ND	ND	ND	677.740	117.128	ND	ND
S16St07	ND	1.080	ND	ND	ND	ND	68.426	DET	ND
S16St08	ND	DET	ND	ND	ND	102.557	34.634	ND	ND
S16St09	ND	ND	ND	ND	ND	ND	DET	ND	ND
S16St10	ND	ND	ND	ND	ND	ND	ND	ND	ND
S16BF	ND	ND	ND	ND	ND	ND	ND	ND	ND
S16	*NQ*	*6.569*	*NQ*	*NQ*	*NQ*	*1276.855*	*321.604*	*57.323*	*NQ*

IF: inlet filter / BF: backup filter / ND: not detectedND: not detected / DET: detected / NQ: not quantifiable

Table A3.
Method detection limits (MDL) and quantification limits (MQL) for ions (ng/m3).

	MDL	MQL
Cl^-	7.11	23.7
NO_3^-	28.26	94.2
SO_4^{2-}	1.41	4.7
MSA	0.12	0.4
Br^-	0.03	0.1
C_2-ox	0.87	2.9
C_3-mal	0.09	0.3
C_4-suc	0.21	0.7
***h* C_4-mal**	*0.09*	0.3
Na^+	21.78	72.6
NH_4^+	6.21	20.7
K^+	3.81	12.7
Mg^{2+}	4.44	14.8

Table A4.
Distribution parameters (median, first and third quartiles) of the concentration of ions in various dimensional classes of particulate (ng/m3).

		IF >18 µm	St01 18-10 µm	St02 10-5.6 µm	St03 5.6-3.2 µm	St04 3.2-1.8 µm	St05 1.8-1.0 µm	St06 1-0.56 µm	St07 0.56-0.32 µm	St08 0.32-0.18 µm	St09 0.18-0.10 µm	St10 0.10-0.056 µm	BF <0.056 µm
Cl^-	**Mediane**	229.54	436.35	945.91	415.94	74.94	55.83	67.06	33.23	23.81	NQ	NQ	NQ
	First quartile	197.77	337.84	711.41	311.03	44.20	34.46	33.29	27.93	22.35	NQ	NQ	NQ
	Third quartile	275.76	552.59	1146.08	595.99	93.00	101.84	83.97	38.53	25.28	NQ	NQ	NQ
NO_3^-	**Mediane**	126.05	124.41	250.16	436.77	273.53	515.13	646.54	321.51	174.11	110.47	NQ	NQ
	First quartile	111.48	111.45	216.10	259.19	178.06	385.43	348.79	176.24	97.55	110.47	NQ	NQ
	Third quartile	170.89	166.90	461.14	631.81	381.15	1444.14	1122.77	460.42	217.84	110.47	NQ	NQ
SO_4^{2-}	**Mediane**	165.98	186.31	258.58	203.88	177.77	506.26	795.95	442.11	208.66	87.76	18.97	16.91
	First quartile	132.61	165.48	227.95	173.45	110.25	363.49	586.31	266.99	138.56	44.44	10.51	11.10
	Third quartile	186.63	223.25	326.92	244.25	233.52	929.87	1200.93	791.80	344.84	141.74	27.97	18.15
MSA	**Mediane**	0.57	0.55	0.64	0.69	1.09	4.26	6.42	4.88	3.05	1.52	0.59	0.56
	First quartile	0.57	0.51	0.62	0.53	0.68	3.00	5.53	4.02	1.73	0.88	0.46	0.56
	Third quartile	0.57	0.59	0.65	0.94	1.60	5.00	8.04	5.78	3.32	1.78	0.72	0.56
Br^-	**Mediane**	0.89	1.51	2.51	1.43	0.30	0.44	0.68	0.35	0.21	0.16	0.12	0.14
	First quartile	0.57	1.10	1.85	0.93	0.24	0.35	0.51	0.32	0.19	0.13	0.11	0.12
	Third quartile	1.22	1.82	2.95	1.57	0.43	0.57	0.92	0.45	0.31	0.18	0.14	0.16
C_2-ox	**Mediane**	5.71	4.71	7.27	9.99	12.96	27.32	31.69	24.27	14.67	9.17	4.51	3.80
	First quartile	4.07	3.99	5.08	7.93	10.16	23.75	26.19	18.41	12.41	5.21	4.05	3.48
	Third quartile	6.25	6.81	10.32	15.91	22.02	30.96	34.81	28.21	18.75	12.00	6.41	4.19
C_3-mal	**Mediane**	1.31	1.38	2.06	3.70	3.40	3.49	3.42	2.20	1.45	1.00	0.52	0.42
	First quartile	0.80	0.63	1.06	2.23	2.46	2.54	1.59	1.07	0.74	0.49	0.49	0.40
	Third quartile	2.37	1.75	3.07	4.94	5.71	4.14	3.86	2.75	1.71	1.14	0.68	0.54
C_4-suc	**Mediane**	2.12	1.30	1.17	0.89	0.89	1.18	1.33	1.00	0.77	NQ	NQ	NQ
	First quartile	1.43	1.21	1.01	0.80	0.79	0.91	0.92	0.98	0.75	NQ	NQ	NQ
	Third quartile	2.42	1.88	1.31	1.04	0.91	1.67	1.61	1.00	0.79	NQ	NQ	NQ
hC_4-mal	**Mediane**	0.74	0.53	0.81	1.15	1.41	4.15	7.54	4.61	2.10	1.04	0.85	0.43
	First quartile	0.55	0.36	0.66	0.77	0.86	2.41	2.79	1.98	1.01	0.82	0.76	0.42
	Third quartile	0.85	0.81	0.95	1.57	2.19	5.94	10.56	7.20	3.39	1.73	1.04	0.55
Na^+	**Mediane**	187.89	249.79	590.11	264.24	113.72	90.89	97.35	NQ	NQ	NQ	184.05	NQ
	First quartile	156.01	236.34	420.87	249.18	97.20	90.89	97.35	NQ	NQ	NQ	184.05	NQ
	Third quartile	200.23	355.73	713.03	374.47	120.15	90.89	97.35	NQ	NQ	NQ	184.05	NQ
NH_4^+	**Mediane**	52.49	64.87	38.51	27.61	47.38	168.38	202.11	188.09	86.82	48.39	22.36	74.43
	First quartile	52.49	64.87	38.51	24.83	37.95	74.18	164.40	99.60	44.02	29.05	22.06	74.43
	Third quartile	52.49	64.87	38.51	28.57	85.99	274.19	449.55	260.03	127.99	112.59	22.66	74.43
K^+	**Mediane**	26.20	15.81	26.29	22.05	15.43	41.30	35.78	25.13	29.66	16.68	NQ	NQ
	First quartile	20.37	14.73	20.99	18.01	14.08	18.67	27.34	17.73	23.46	13.86	NQ	NQ
	Third quartile	31.83	17.11	37.87	28.20	18.49	60.24	81.10	50.33	32.66	16.99	NQ	NQ
Mg^{2+}	**Mediane**	19.14	24.16	51.65	34.21	23.19	24.62	25.86	20.33	NQ	NQ	NQ	NQ
	First quartile	18.57	18.56	40.85	29.21	21.17	18.85	21.57	20.33	NQ	NQ	NQ	NQ
	Third quartile	19.70	27.76	71.36	54.05	25.29	27.07	30.14	20.33	NQ	NQ	NQ	NQ

IF: inlet filter / BF: backup filter / NQ: not quantifiable

Table A5.
Metal concentration data (ng/m3).

	Li	Be	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Rb	Sr
S01IF	0.0674	ND	4.42	0.074	0.345	0.652	32.7	ND	0.330	0.594	ND	0.012	0.190	ND	0.008	0.080	0.659
S01St01	0.0339	ND	5.07	0.081	0.054	0.686	30.4	ND	ND	0.432	0.168	0.023	0.216	ND	0.081	0.101	0.751
S01St02	0.1186	ND	8.11	0.244	0.609	1.745	91.5	ND	0.083	1.311	ND	0.042	0.226	ND	0.035	0.189	1.355
S01St03	0.1505	ND	9.78	0.305	0.697	2.330	121.1	ND	0.269	2.237	2.450	0.042	0.196	ND	0.072	0.211	1.522
S01St04	0.0711	ND	6.21	0.187	0.254	1.229	60.1	ND	0.347	1.280	0.455	0.030	0.210	ND	0.127	0.128	0.903
S01St05	0.0648	ND	4.46	0.212	0.373	0.828	33.6	ND	ND	0.642	ND	0.016	0.166	ND	0.124	0.079	0.678
S01St06	0.0459	ND	3.85	0.382	0.176	0.737	15.2	ND	0.039	0.358	1.770	0.019	0.171	ND	0.140	0.090	0.596
S01St07	0.0242	ND	2.96	0.469	0.213	0.494	5.8	ND	0.067	0.144	0.127	0.009	0.200	ND	0.094	0.099	0.424
S01St08	0.0794	ND	2.83	0.678	ND	0.292	2.2	ND	0.349	0.134	ND	0.002	0.156	ND	0.133	0.068	0.398
S01St09	0.0822	ND	3.90	1.016	0.151	0.294	3.1	ND	0.670	0.144	ND	0.015	0.206	ND	0.081	0.061	0.524
S01St10	0.0135	ND	3.58	0.329	0.094	0.172	0.7	ND	0.078	0.040	ND	0.018	0.178	ND	0.070	0.060	0.485
S01BF	0.0072	ND	2.88	0.144	0.059	0.145	ND	ND	ND	ND	ND	0.000	0.168	ND	0.040	0.030	0.365
S01	*0.8*	*NQ*	*58.0*	*4.1*	*3.0*	*9.6*	*396.3*	*NQ*	*2.2*	*7.3*	*5.0*	*0.2*	*2.3*	*NQ*	*1.0*	*1.2*	*8.7*
S02IF	0.0613	ND	3.78	0.108	0.243	0.483	14.4	ND	0.205	0.255	1.679	0.007	0.121	ND	0.115	0.064	0.564
S02St01	0.0261	ND	4.73	0.187	0.331	0.697	23.5	ND	0.345	0.619	4.275	0.040	0.144	ND	0.153	0.135	0.925
S02St02	0.0966	ND	5.83	0.237	0.740	1.081	41.7	ND	0.269	0.853	2.950	0.026	0.243	ND	0.100	0.139	1.265
S02St03	0.0582	ND	9.45	0.410	0.773	1.800	80.7	0.028	0.328	2.090	7.816	0.062	0.184	ND	0.228	0.222	1.388
S02St04	0.0263	ND	6.49	0.283	0.459	0.986	49.7	ND	0.205	0.919	3.113	0.039	0.150	ND	0.132	0.135	0.783
S02St05	0.0314	ND	5.40	0.396	0.528	0.739	29.2	ND	0.402	0.521	2.796	0.024	0.194	ND	0.252	0.107	0.680
S02St06	0.0511	ND	3.55	0.629	0.139	0.520	12.9	ND	0.401	0.410	1.803	0.039	0.128	ND	0.381	0.105	0.519
S02St07	0.0403	ND	4.33	0.871	0.474	0.401	7.7	ND	0.697	0.267	2.194	0.054	0.174	ND	0.356	0.128	0.782
S02St08	0.0925	ND	4.60	1.003	0.055	0.376	5.5	ND	0.636	0.223	1.741	0.056	0.255	ND	0.256	0.116	0.831
S02St09	0.0628	ND	3.89	0.693	0.198	0.295	5.0	ND	0.524	0.162	ND	0.055	0.210	ND	0.218	0.103	0.728
S02St10	0.0027	ND	3.11	0.243	8.469	0.504	42.0	0.031	0.335	0.135	ND	0.040	0.184	ND	0.155	0.077	0.536
S02BF	0.0135	ND	3.97	0.120	ND	0.216	2.4	ND	0.019	0.060	ND	0.042	0.190	ND	0.136	0.084	0.639
S02	*0.6*	*NQ*	*59.1*	*5.2*	*12.4*	*8.1*	*314.5*	*0.1*	*4.4*	*6.5*	*28.4*	*0.5*	*2.2*	*NQ*	*2.5*	*1.4*	*9.6*
S03IF	0.0941	ND	6.10	0.127	0.101	0.673	22.0	0.022	0.462	0.258	2.068	0.056	0.171	ND	0.229	0.121	0.831
S03St01	0.1362	ND	5.41	0.139	ND	1.081	42.7	0.021	0.286	0.463	2.315	0.034	0.106	ND	0.133	0.147	0.697
S03St02	0.1628	ND	9.62	0.303	ND	2.452	93.9	0.038	0.482	1.271	2.278	0.063	0.142	ND	0.177	0.267	1.398
S03St03	0.1238	ND	9.97	0.354	0.201	2.870	120.3	0.048	1.459	2.170	3.943	0.067	0.182	ND	0.265	0.291	1.327
S03St04	0.1123	ND	5.68	0.191	0.070	1.411	55.0	0.023	0.478	1.226	2.196	0.044	0.165	ND	0.127	0.136	3.998
S03St05	0.1169	ND	4.67	0.237	0.221	0.846	28.5	ND	0.487	0.719	3.049	0.043	0.172	ND	0.290	0.116	0.724
S03St06	0.0614	ND	3.71	0.350	8.443	0.893	50.0	0.035	0.472	0.459	2.195	0.035	0.127	ND	0.347	0.103	0.488
S03St07	0.0928	ND	3.30	0.392	2.483	0.606	18.5	0.019	0.593	0.288	2.370	0.034	0.190	ND	0.372	0.114	0.613
S03St08	0.0707	ND	3.23	0.515	ND	0.369	3.6	ND	0.533	0.219	ND	0.037	0.177	ND	0.304	0.108	0.580
S03St09	0.0877	ND	2.72	0.389	0.204	0.269	4.4	ND	0.465	0.061	ND	0.022	0.176	ND	0.244	0.062	0.488
S03St10	0.0912	ND	3.97	0.112	0.108	0.339	4.6	ND	0.525	0.052	2.631	0.049	0.233	ND	0.195	0.099	0.775
S03BF	0.0911	ND	3.04	0.077	4.556	0.434	23.7	0.025	0.399	0.110	1.475	0.044	0.157	ND	0.126	0.090	0.610
S03	*1.2*	*NQ*	*61.4*	*3.2*	*16.4*	*12.2*	*467.3*	*0.2*	*6.6*	*7.3*	*24.5*	*0.5*	*2.0*	*NQ*	*2.8*	*1.7*	*12.5*

IF: inlet filter / BF: backup filter / ND: not detected; NQ: not quantifiable

Table A5.
Metal concentration data (ng/m3).

	Li	Be	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Rb	Sr
S04IF	0.0820	ND	5.80	0.116	0.015	0.798	24.7	0.035	0.398	0.449	1.504	0.056	0.186	ND	0.262	0.152	0.943
S04St01	0.0857	ND	6.51	0.143	0.033	0.990	27.1	0.024	0.875	0.530	3.501	0.062	0.280	ND	0.154	0.165	1.310
S04St02	0.1033	ND	7.55	0.228	0.159	1.817	57.2	0.032	0.634	1.402	2.712	0.071	0.194	ND	0.123	0.202	1.608
S04St03	0.1112	ND	7.34	0.216	0.248	1.676	61.6	0.032	0.598	1.964	3.349	0.065	0.237	ND	0.218	0.187	1.259
S04St04	0.0666	ND	6.32	0.182	0.056	1.081	47.3	0.025	0.510	1.470	3.210	0.053	0.211	ND	0.112	0.132	0.913
S04St05	0.0724	ND	6.44	0.251	ND	1.022	28.7	0.022	0.832	0.945	6.627	0.073	0.238	ND	0.347	0.169	0.993
S04St06	0.1053	ND	6.68	0.384	0.158	1.136	50.4	0.022	0.747	0.639	5.154	0.072	0.224	ND	0.468	0.164	1.031
S04St07	0.0472	ND	5.59	0.378	ND	0.621	10.0	ND	0.712	0.357	4.113	0.045	0.218	ND	0.203	0.118	0.740
S04St08	0.0521	ND	5.48	0.471	ND	0.485	4.6	ND	1.161	0.256	2.767	0.062	0.232	ND	0.344	0.135	0.864
S04St09	0.0785	ND	4.70	0.416	ND	0.359	4.3	ND	0.754	0.150	3.018	0.051	0.229	ND	0.409	0.120	0.791
S04St10	0.0310	ND	5.40	0.161	ND	0.321	3.5	ND	0.509	0.089	2.777	0.061	0.223	ND	0.197	0.115	0.837
S04BF	0.0670	ND	7.95	0.147	0.040	0.406	8.7	0.019	0.608	0.059	2.566	0.076	0.277	ND	0.243	0.127	1.110
S04	*0.9*	*NQ*	*75.8*	*3.1*	*0.7*	*10.7*	*328.0*	*0.2*	*8.3*	*8.3*	*41.3*	*0.7*	*2.8*	*NQ*	*3.1*	*1.8*	*12.4*
S05IF	0.4541	0.0136	14.56	0.194	2.042	1.592	33.5	0.143	3.135	0.491	ND	0.225	0.144	ND	0.757	0.589	3.363
S05St01	0.3620	ND	13.88	0.113	1.765	1.561	34.4	0.013	2.855	0.599	ND	0.184	0.180	ND	0.743	0.368	3.231
S05St02	0.4747	ND	14.71	0.158	1.843	1.988	51.2	0.030	3.058	1.264	ND	0.193	0.200	ND	0.810	0.426	3.592
S05St03	0.4465	ND	15.90	0.184	2.081	2.398	78.5	ND	3.385	2.476	ND	0.190	0.249	ND	0.839	0.384	3.465
S05St04	0.4430	ND	16.28	0.190	1.997	2.064	60.2	0.006	3.585	1.753	3.803	0.219	0.307	ND	0.865	0.342	3.433
S05St05	0.4201	ND	14.92	0.291	1.792	2.172	38.8	0.025	3.284	1.037	4.597	0.213	0.206	ND	0.915	0.420	3.213
S05St06	0.4113	ND	13.90	0.450	1.695	2.240	29.7	0.031	3.318	0.782	2.379	0.215	0.234	ND	1.068	0.428	3.209
S05St07	0.4323	ND	13.91	0.426	1.542	1.649	26.5	ND	3.253	0.460	ND	0.193	0.307	ND	0.996	0.346	3.101
S05St08	0.4115	ND	13.29	0.546	1.574	1.431	24.9	ND	3.422	0.414	ND	0.194	0.283	ND	0.941	0.322	3.147
S05St09	0.3977	ND	14.27	0.342	1.695	1.342	25.7	ND	3.391	0.301	ND	0.192	0.322	ND	1.060	0.253	3.212
S05St10	0.3993	ND	13.16	0.087	1.738	1.251	24.2	ND	3.119	0.184	ND	0.186	0.252	ND	0.895	0.277	3.029
S05BF	0.4609	ND	14.09	0.100	1.611	1.354	23.6	0.011	3.195	0.256	ND	0.209	0.255	ND	0.816	0.319	3.265
S05	*5.1*	*0.0*	*172.9*	*3.1*	*21.4*	*21.0*	*451.2*	*0.3*	*39.0*	*10.0*	*10.8*	*2.4*	*2.9*	*NQ*	*10.7*	*4.5*	*39.3*
S06IF	ND	ND	3.64	ND	0.360	0.781	33.5	ND	0.367	0.281	ND	ND	0.143	ND	0.020	ND	0.329
S06St01	ND	ND	3.53	ND	0.437	1.129	39.5	ND	0.340	0.502	ND	ND	0.073	ND	0.036	ND	0.353
S06St02	0.0258	ND	5.35	0.139	0.966	2.531	88.7	ND	0.484	1.908	3.257	ND	0.052	ND	ND	ND	0.684
S06St03	ND	ND	4.38	0.129	0.832	2.392	113.6	ND	0.371	3.140	5.734	ND	0.035	ND	ND	ND	0.264
S06St04	ND	ND	3.05	0.052	0.551	1.164	61.1	ND	0.328	1.612	6.251	ND	0.060	ND	0.084	ND	0.187
S06St05	ND	ND	0.32	0.706	0.492	1.458	18.0	ND	0.684	0.912	10.822	ND	0.007	0.272	0.434	ND	0.011
S06St06	ND	ND	1.84	0.408	0.689	1.694	35.0	ND	0.619	1.283	14.608	ND	ND	ND	0.428	ND	0.314
S06St07	0.1549	ND	3.54	1.209	1.101	1.194	18.5	0.176	1.502	1.133	3.557	0.075	0.083	0.279	0.543	ND	0.926
S06St08	0.0075	ND	1.68	0.953	0.443	0.334	11.1	ND	0.815	0.428	ND	ND	0.069	ND	0.297	ND	0.248
S06St09	ND	ND	0.36	0.015	ND	ND	ND	ND	0.303	ND	ND	ND	0.060	ND	ND	ND	ND
S06St10	ND	ND	0.42	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.031	ND	ND	ND	ND
S06BF	ND	ND	0.47	ND	ND	ND	1.2	ND	ND	ND	ND	ND	0.032	ND	ND	ND	ND
S06	*0.2*	*NQ*	*28.6*	*3.6*	*5.9*	*12.7*	*420.2*	*0.2*	*5.8*	*11.2*	*44.2*	*0.1*	*0.6*	*0.6*	*1.8*	*NQ*	*3.3*

IF: inlet filter / BF: backup filter / ND: not detected; NQ: not quantifiable

Table A5.
Metal concentration data (ng/m3).

	Li	Be	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Rb	Sr
S07IF	0.0525	ND	1.91	0.062	0.120	0.580	21.7	ND	0.031	0.268	ND	ND	ND	ND	ND	ND	0.059
S07St01	0.0702	ND	2.46	0.135	0.181	0.917	32.4	ND	0.086	0.615	ND	ND	ND	ND	ND	ND	0.266
S07St02	0.0492	ND	5.65	0.266	0.492	1.831	67.8	0.005	0.322	1.573	1.671	ND	0.036	ND	0.012	ND	0.744
S07St03	0.1322	ND	7.79	0.400	0.947	2.743	147.1	0.003	0.487	2.969	4.327	ND	0.078	ND	ND	ND	0.726
S07St04	0.0503	ND	2.99	0.176	0.421	1.005	56.2	ND	0.319	1.208	3.766	ND	ND	ND	ND	ND	0.056
S07St05	0.1680	0.1275	2.20	0.814	0.931	1.748	35.6	0.658	1.385	1.540	7.230	0.328	ND	ND	0.794	0.302	0.788
S07St06	0.1077	0.0846	0.78	1.108	0.556	1.278	14.3	0.448	0.877	0.848	3.070	0.269	0.029	ND	0.832	0.101	0.514
S07St07	0.0833	0.0641	0.68	1.098	0.464	0.961	11.7	0.407	0.803	0.733	ND	0.251	0.030	ND	0.642	0.012	0.410
S07St08	0.0987	0.0631	1.71	1.037	0.481	0.777	10.7	0.379	0.919	0.585	ND	0.258	0.136	ND	0.655	ND	0.551
S07St09	0.1544	0.0899	1.91	0.673	0.593	0.734	9.5	0.463	1.438	0.575	ND	0.278	0.115	ND	0.706	0.004	0.685
S07St10	0.0893	0.0666	1.71	0.284	0.550	0.642	7.6	0.414	0.535	0.422	ND	0.264	0.133	ND	0.406	ND	0.619
S07BF	0.1405	0.0751	1.79	0.252	0.496	0.645	7.0	0.428	0.590	0.398	ND	0.267	0.134	ND	0.405	ND	0.600
S07	*1.2*	*0.6*	*31.6*	*6.3*	*6.2*	*13.9*	*421.6*	*3.2*	*7.8*	*11.7*	*20.1*	*1.9*	*0.7*	*NQ*	*4.5*	*0.4*	*6.0*
S08IF	0.0292	ND	2.04	0.065	0.227	0.676	26.7	0.004	0.136	0.336	ND	0.021	0.044	ND	0.004	ND	0.255
S08St01	0.0454	ND	3.49	0.175	0.416	1.174	47.8	0.014	0.471	0.857	1.352	0.034	0.051	ND	0.101	ND	0.507
S08St02	0.2513	0.1295	6.64	0.901	1.707	3.163	110.2	0.695	0.523	3.264	4.272	0.230	ND	ND	0.587	0.445	1.689
S08St03	0.1054	ND	6.80	0.411	1.019	3.054	157.5	0.012	0.509	3.989	4.449	0.061	0.114	ND	0.142	ND	0.987
S08St04	0.0499	0.0018	3.00	0.176	0.505	1.573	63.5	0.010	0.260	2.101	3.669	0.036	0.041	ND	0.131	ND	0.308
S08St05	0.0559	ND	1.91	0.134	0.493	1.508	29.6	ND	0.186	0.898	6.915	0.030	0.088	ND	0.183	ND	0.177
S08St06	0.0212	ND	0.80	0.202	0.213	1.654	12.3	0.010	0.209	0.452	5.274	0.030	0.030	ND	0.237	ND	0.027
S08St07	0.0825	ND	1.30	0.268	0.277	0.863	7.9	0.012	0.379	0.372	1.560	0.038	0.071	ND	0.197	ND	0.169
S08St08	0.0496	ND	0.91	0.271	0.186	0.337	4.0	ND	0.295	0.283	ND	0.027	0.075	ND	0.211	ND	0.108
S08St09	0.0118	ND	0.46	0.148	0.059	0.082	1.2	ND	0.157	0.129	ND	0.010	0.031	ND	0.138	ND	ND
S08St10	0.0298	ND	0.74	0.099	ND	0.140	ND	0.081	0.143	0.149	ND	0.049	0.003	ND	0.201	ND	0.207
S08BF	0.0239	0.0071	0.91	0.027	ND	0.104	0.2	0.041	0.086	0.136	ND	0.030	0.055	ND	0.169	ND	0.178
S08	*0.8*	*0.1*	*29.0*	*2.9*	*5.1*	*14.3*	*460.8*	*0.9*	*3.4*	*13.0*	*27.5*	*0.6*	*0.6*	*NQ*	*2.3*	*0.4*	*4.6*
S09IF	0.0220	ND	1.78	ND	0.513	0.269	11.4	ND	2.032	0.888	1.364	ND	0.041	ND	0.056	ND	0.238
S09St01	ND	ND	1.86	0.027	0.148	0.659	17.5	ND	0.117	0.730	ND	0.004	0.043	ND	0.014	ND	0.405
S09St02	0.0150	ND	1.93	ND	0.040	0.873	26.5	ND	ND	1.192	ND	ND	0.000	ND	ND	ND	0.372
S09St03	0.0169	ND	2.19	0.017	0.516	1.160	48.6	ND	0.648	2.184	ND	ND	0.018	ND	ND	ND	0.346
S09St04	ND	ND	0.96	0.051	0.194	0.671	35.1	ND	ND	1.466	ND	ND	ND	ND	0.057	ND	0.060
S09St05	ND	ND	1.06	0.068	ND	0.860	19.0	ND	0.003	0.664	2.665	ND	0.043	ND	0.143	ND	0.074
S09St06	0.0139	ND	1.25	0.197	ND	1.026	8.2	ND	0.067	0.403	0.219	ND	0.071	ND	0.245	ND	0.057
S09St07	ND	ND	0.71	0.251	ND	0.444	4.1	ND	0.050	0.428	ND	ND	0.032	ND	0.176	ND	0.052
S09St08	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.039	ND	ND	ND	ND
S09St09	ND	ND	0.13	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.048	ND	ND	ND	ND
S09St10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.057	ND	ND	ND	ND
S09BF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.014	ND	ND	ND	ND
S09	*0.1*	*NQ*	*11.9*	*0.6*	*1.4*	*6.0*	*170.4*	*NQ*	*2.9*	*8.0*	*4.2*	*0.0*	*0.4*	*NQ*	*0.7*	*NQ*	*1.6*

IF: inlet filter / BF: backup filter / ND: not detected; NQ: not quantifiable

Table A5.
Metal concentration data (ng/m3).

	Li	Be	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Rb	Sr
S10IF	ND	ND	2.47	0.059	0.202	0.430	10.7	0.051	0.148	0.225	ND	0.021	0.037	ND	0.104	ND	0.325
S10St01	0.4739	0.0846	15.45	0.495	2.699	2.429	49.9	1.228	2.465	0.704	1.302	0.072	0.200	0.181	0.449	0.606	3.202
S10St02	0.4646	0.0933	16.76	0.575	2.827	3.216	78.8	1.254	2.644	1.323	1.302	0.082	0.163	0.181	0.528	0.670	3.299
S10St03	0.6176	0.1096	23.20	0.827	3.513	5.184	207.8	1.311	3.131	3.307	7.269	0.130	0.249	0.181	0.797	0.847	3.936
S10St04	0.4896	0.0761	15.08	0.556	2.826	2.817	82.1	1.225	2.998	1.593	4.835	0.070	0.204	0.181	0.693	0.630	3.036
S10St05	0.5001	0.0785	13.84	0.666	2.854	2.911	52.8	1.277	2.620	1.233	10.081	0.087	0.202	0.181	0.876	0.780	3.137
S10St06	0.4368	0.0765	12.61	0.746	2.819	2.862	34.7	1.222	2.663	1.034	10.069	0.071	0.230	0.181	1.016	0.834	2.929
S10St07	0.4762	0.0668	12.57	0.815	2.727	2.289	28.7	1.222	2.769	0.878	6.282	0.059	0.213	0.181	0.918	0.750	2.843
S10St08	0.4245	0.0706	12.40	0.941	2.617	1.891	21.8	1.268	2.747	0.673	4.407	0.065	0.182	0.181	1.079	0.656	2.801
S10St09	0.4728	0.0629	12.15	0.680	2.923	1.660	21.8	1.215	2.438	0.460	1.302	0.058	0.182	0.181	0.813	0.553	2.794
S10St10	0.6531	0.3318	11.41	0.823	3.150	1.929	20.8	1.476	3.445	0.579	1.302	0.265	0.157	0.181	0.774	0.846	2.996
S10BF	0.6769	0.3388	11.58	0.809	2.839	1.901	20.1	1.481	2.627	0.815	1.302	0.266	0.162	0.181	0.718	0.865	3.005
S10	*5.7*	*1.4*	*159.5*	*8.0*	*32.0*	*29.5*	*630.0*	*14.2*	*30.7*	*12.8*	*49.5*	*1.2*	*2.2*	*2.0*	*8.8*	*8.0*	*34.3*
S11IF	ND	ND	2.29	0.012	0.936	0.335	15.6	ND	ND	0.086	ND	ND	0.036	ND	0.005	ND	0.219
S11St01	ND	ND	4.26	0.086	1.864	1.056	40.7	ND	0.345	0.568	1.879	0.002	0.035	ND	0.043	ND	0.559
S11St02	ND	ND	5.33	0.137	1.654	1.465	57.7	0.005	0.056	1.096	1.906	0.005	ND	ND	0.013	ND	0.622
S11St03	0.0321	ND	7.04	0.186	0.881	1.970	94.4	0.005	0.143	2.084	2.451	0.015	ND	ND	0.031	ND	0.521
S11St04	0.0001	ND	4.08	0.112	0.041	1.232	60.5	ND	0.126	1.370	4.351	0.007	ND	ND	ND	ND	0.219
S11St05	0.0974	ND	2.18	0.179	0.676	1.649	35.2	ND	0.178	1.182	9.401	0.011	0.085	0.046	0.181	0.029	0.155
S11St06	ND	ND	0.93	0.180	0.171	1.174	13.3	ND	0.173	0.506	7.525	ND	ND	0.047	0.265	ND	0.035
S11St07	ND	ND	0.26	0.247	ND	0.552	4.0	0.042	0.104	0.386	4.356	ND	ND	ND	0.184	ND	0.012
S11St08	ND	ND	0.43	0.231	ND	0.166	1.3	ND	0.130	0.201	3.313	ND	ND	ND	0.134	ND	ND
S11St09	ND	ND	0.32	0.113	ND	ND	ND	0.052	ND	0.026	ND	ND	ND	ND	0.027	ND	0.023
S11St10	ND	ND	0.58	ND	ND	ND	ND	ND	ND	ND	1.524	ND	ND	ND	ND	ND	0.011
S11BF	ND	ND	0.16	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S11	*0.1*	*NQ*	*27.9*	*1.5*	*6.2*	*9.6*	*322.6*	*0.1*	*1.3*	*7.5*	*36.7*	*0.0*	*0.2*	*0.1*	*0.9*	*0.0*	*2.4*
S12IF	0.0220	ND	2.49	0.032	0.052	0.456	15.6	ND	ND	0.137	ND	ND	0.054	ND	ND	ND	0.336
S12St01	ND	ND	10.35	0.075	ND	0.450	13.8	ND	1.245	0.103	ND	0.043	ND	ND	0.354	ND	1.848
S12St02	0.0587	ND	4.94	0.062	0.204	1.473	50.6	ND	0.076	0.844	0.229	ND	0.108	ND	0.017	ND	0.990
S12St03	0.0866	ND	8.75	0.185	0.750	2.377	107.8	ND	0.367	2.151	3.417	ND	0.116	ND	0.056	ND	1.451
S12St04	0.0396	ND	3.66	0.033	ND	0.868	45.2	ND	0.043	0.793	2.923	ND	0.063	ND	0.036	ND	0.426
S12St05	0.0236	ND	2.02	0.154	ND	1.009	22.3	ND	0.070	0.511	4.369	ND	0.069	ND	0.254	ND	0.188
S12St06	0.0120	ND	1.09	0.407	0.337	1.070	10.3	ND	1.180	0.560	4.484	ND	0.161	ND	0.502	ND	0.046
S12St07	0.0105	ND	0.31	0.434	0.024	0.330	2.9	ND	0.085	0.280	1.281	ND	0.081	ND	0.557	ND	ND
S12St08	ND	0.0037	8.07	0.437	ND	ND	ND	ND	1.454	0.053	0.226	ND	ND	ND	1.366	ND	1.278
S12St09	ND	0.0732	8.59	0.243	ND	ND	ND	0.152	1.346	0.068	ND	0.060	ND	ND	0.803	0.019	1.591
S12St10	ND	0.0073	7.14	ND	ND	ND	ND	ND	1.075	ND	ND	ND	ND	ND	0.318	ND	1.160
S12BF	ND	0.0429	11.55	0.152	ND	0.042	ND	0.120	1.310	ND	ND	0.086	ND	ND	0.465	0.030	1.955
S12	*0.3*	*0.1*	*69.0*	*2.2*	*1.4*	*8.1*	*268.5*	*0.3*	*8.3*	*5.5*	*16.9*	*0.2*	*0.7*	*NQ*	*4.7*	*0.0*	*11.3*

IF: inlet filter / BF: backup filter / ND: not detected; NQ: not quantifiable

Table A5.
Metal concentration data (ng/m3).

	Li	Be	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Rb	Sr
S13IF	0.0342	ND	3.06	0.068	0.225	0.243	8.5	ND	0.545	0.153	ND	0.026	0.119	ND	ND	0.044	0.606
S13St01	0.0440	ND	5.15	0.096	0.318	0.545	16.1	0.016	1.013	0.317	1.851	0.037	0.204	ND	0.116	0.079	1.059
S13St02	0.0746	ND	5.18	0.136	0.340	0.988	34.0	0.018	0.721	0.975	2.272	0.039	0.179	ND	0.237	0.098	1.232
S13St03	0.2224	ND	2.83	0.261	7.029	2.265	108.3	0.068	ND	2.192	3.527	0.028	0.626	ND	ND	0.169	0.066
S13St04	0.2334	ND	2.87	0.279	7.099	1.911	98.3	0.068	ND	1.446	4.757	0.027	0.668	ND	ND	0.158	ND
S13St05	0.0816	ND	5.81	0.422	1.167	1.310	39.5	0.024	1.022	0.686	6.478	0.049	0.201	ND	0.702	0.191	0.791
S13St06	0.0533	ND	4.28	0.609	0.502	1.027	14.0	0.019	0.733	0.491	5.101	0.035	0.171	ND	1.172	0.198	0.547
S13St07	0.0703	ND	3.86	0.632	0.411	0.634	8.8	0.019	0.682	0.372	5.315	0.039	0.213	ND	1.797	0.190	0.627
S13St08	0.0530	ND	3.62	0.502	0.431	0.321	6.7	0.018	0.541	0.298	3.864	0.031	0.154	ND	2.141	0.134	0.534
S13St09	0.0530	ND	3.76	0.139	2.226	0.318	13.2	0.017	0.589	0.174	2.014	0.038	0.193	ND	0.882	0.109	0.629
S13St10	0.0478	ND	4.25	0.064	0.432	0.231	5.2	ND	0.260	0.065	ND	0.033	0.226	ND	0.247	0.085	0.642
S13BF	ND	ND	2.79	0.031	0.366	0.160	3.4	ND	0.221	0.017	ND	0.020	0.169	ND	0.102	0.056	0.485
S13	*1.0*	*NQ*	*47.5*	*3.2*	*20.5*	*10.0*	*355.8*	*0.3*	*6.3*	*7.2*	*35.2*	*0.4*	*3.1*	*NQ*	*7.4*	*1.5*	*7.2*
S14IF	0.1430	ND	ND	0.035	7.494	0.897	24.0	0.049	ND	0.504	2.031	ND	0.801	ND	ND	0.044	ND
S14St01	0.1764	ND	ND	0.085	8.408	1.190	37.7	0.057	ND	0.924	2.383	ND	0.763	ND	ND	0.054	ND
S14St02	0.1594	ND	ND	0.160	8.080	2.015	71.4	0.063	ND	2.756	4.255	ND	0.763	ND	ND	0.105	ND
S14St03	0.1532	ND	ND	0.205	9.909	2.348	115.2	0.074	ND	4.702	5.661	ND	0.716	ND	ND	0.095	ND
S14St04	0.1707	ND	ND	0.200	7.928	1.779	67.7	0.064	ND	2.683	7.201	ND	0.770	ND	ND	0.091	ND
S14St05	0.0241	ND	5.59	0.703	0.263	2.382	30.7	0.025	2.555	1.649	12.466	0.059	0.198	ND	0.558	0.245	0.903
S14St06	0.0104	ND	4.45	0.938	0.432	1.781	15.9	0.021	0.809	0.881	8.364	0.049	0.200	ND	0.651	0.310	0.868
S14St07	0.0346	ND	3.73	0.753	ND	0.825	6.7	0.019	0.522	0.547	4.292	0.046	0.179	ND	0.362	0.265	0.709
S14St08	0.0024	ND	4.06	0.620	2.456	0.576	16.5	0.023	0.712	0.408	3.231	0.045	0.239	ND	0.525	0.203	0.705
S14St09	0.0291	ND	3.11	0.095	ND	0.242	0.4	ND	0.143	0.076	2.307	0.035	0.242	ND	0.154	0.114	0.645
S14St10	ND	ND	3.79	0.056	ND	0.208	1.0	ND	0.064	0.061	ND	0.038	0.200	ND	0.071	0.103	0.688
S14BF	0.0099	ND	5.36	0.063	ND	0.239	2.9	ND	0.142	0.089	2.506	0.045	0.202	ND	ND	0.114	0.762
S14	*0.9*	*NQ*	*30.1*	*3.9*	*45.0*	*14.5*	*390.2*	*0.4*	*4.9*	*15.3*	*54.7*	*0.3*	*5.3*	*NQ*	*2.3*	*1.7*	*5.3*
S15IF	0.0498	ND	3.98	0.077	1.583	0.701	19.5	0.011	0.186	0.348	1.708	0.044	0.359	ND	0.108	0.134	0.789
S15St01	0.0766	ND	4.12	0.087	1.580	1.060	27.1	0.018	0.205	0.649	1.881	0.041	0.387	ND	0.012	0.141	0.832
S15St02	0.0448	ND	5.49	0.155	1.673	2.243	64.8	0.029	0.261	1.964	3.717	0.047	0.298	ND	0.037	0.207	1.187
S15St03	0.1130	ND	7.75	0.226	2.518	3.330	123.9	0.045	0.357	4.139	7.208	0.062	0.366	ND	0.113	0.253	1.217
S15St04	0.0556	ND	4.65	0.148	1.757	1.975	77.4	0.026	0.231	2.353	7.696	0.039	0.283	ND	0.063	0.166	0.664
S15St05	0.0660	ND	3.43	0.136	ND	1.572	22.2	0.014	0.387	0.984	9.319	0.031	0.385	ND	0.072	0.168	0.517
S15St06	0.0901	ND	2.45	0.281	0.312	2.290	14.0	0.018	0.405	0.869	10.063	0.038	0.368	ND	0.282	0.369	0.416
S15St07	0.0890	ND	3.83	0.491	0.390	1.440	10.8	0.021	0.488	0.731	7.294	0.054	0.451	ND	0.386	0.405	0.563
S15St08	0.0805	ND	3.01	0.490	0.738	0.752	5.6	0.019	0.935	0.518	4.359	0.044	0.510	ND	0.446	0.291	0.508
S15St09	0.0525	ND	2.45	0.139	0.061	0.362	ND	0.006	0.248	0.163	1.910	0.031	0.420	ND	0.143	0.142	0.414
S15St10	0.0553	ND	2.67	0.057	0.323	0.334	1.0	0.007	0.160	0.054	1.345	0.033	0.438	ND	0.052	0.128	0.468
S15BF	0.0151	ND	3.21	0.046	1.709	0.380	6.9	0.010	0.243	0.212	1.503	0.036	0.457	ND	0.085	0.111	0.513
S15	*0.8*	*NQ*	*47.0*	*2.3*	*12.6*	*16.4*	*373.2*	*0.2*	*4.1*	*13.0*	*58.0*	*0.5*	*4.7*	*NQ*	*1.8*	*2.5*	*8.1*

IF: inlet filter / BF: backup filter / ND: not detected; NQ: not quantifiable

Table A5.
Metal concentration data (ng/m3).

	Li	Be	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Rb	Sr
S16IF	0.0519	ND	3.77	0.114	2.510	0.705	19.7	0.013	0.243	0.433	3.762	0.042	0.401	ND	0.015	0.122	0.732
S16St01	ND	ND	3.55	0.134	2.852	1.006	24.1	0.017	0.200	1.019	2.895	0.047	0.447	ND	0.061	0.144	0.837
S16St02	ND	ND	5.24	0.170	3.821	1.702	47.2	0.029	0.384	2.161	3.992	0.052	0.516	ND	0.107	0.192	1.039
S16St03	ND	ND	7.56	0.270	3.882	2.389	98.1	0.032	0.460	4.783	7.349	0.068	0.319	ND	0.092	0.188	1.035
S16St04	0.0488	ND	5.80	0.226	4.580	1.878	75.3	0.033	0.519	3.277	12.972	0.066	0.455	ND	0.180	0.207	0.892
S16St05	ND	ND	4.04	0.279	5.254	2.409	75.6	0.029	0.428	1.531	15.588	0.043	0.337	ND	0.199	0.254	0.588
S16St06	0.0588	ND	4.59	0.613	10.467	3.078	57.5	0.078	0.553	1.167	13.469	0.066	0.460	0.635	0.563	0.618	0.710
S16St07	ND	ND	3.25	0.466	3.038	1.147	19.8	0.021	0.338	0.579	6.395	0.040	0.279	0.472	0.630	0.452	0.522
S16St08	ND	ND	4.10	0.438	4.203	0.645	18.6	0.016	0.284	0.398	3.829	0.047	0.416	0.357	0.570	0.312	0.624
S16St09	0.0595	ND	2.61	0.198	2.941	0.401	9.0	0.011	0.182	0.150	2.753	0.034	0.408	ND	0.209	0.183	0.525
S16St10	0.0217	ND	4.09	0.139	3.786	0.407	13.0	0.014	0.205	0.059	ND	0.049	0.411	ND	0.053	0.159	0.672
S16BF	ND	ND	3.06	0.109	4.239	0.396	14.3	0.016	0.125	0.082	ND	0.047	0.417	ND	0.130	0.147	0.589
S16	*0.2*	*NQ*	*51.7*	*3.2*	*51.6*	*16.2*	*472.2*	*0.3*	*3.9*	*15.6*	*73.0*	*0.6*	*4.9*	*1.5*	*2.8*	*3.0*	*8.8*

IF: inlet filter / BF: backup filter / ND: not detected; NQ: not quantifiable

Table A5.
Metal concentration data (ng/m3).

	Mo	Ag	Cd	In	Cs	Ba	Ta	W	Tl	Pb	Bi	U
S01IF	ND	ND	ND	ND	ND	0.944	ND	ND	ND	ND	ND	ND
S01St01	ND	ND	ND	ND	ND	1.673	ND	ND	ND	ND	ND	0.017
S01St02	ND	ND	ND	ND	ND	2.260	ND	ND	ND	ND	ND	0.029
S01St03	ND	ND	ND	ND	ND	3.278	ND	ND	ND	ND	ND	ND
S01St04	ND	ND	ND	ND	ND	2.458	ND	ND	ND	ND	ND	0.009
S01St05	ND	ND	ND	ND	ND	1.853	ND	ND	ND	ND	ND	ND
S01St06	ND	ND	ND	ND	ND	2.076	ND	ND	ND	0.809	ND	0.004
S01St07	ND	ND	ND	ND	ND	1.110	ND	ND	ND	0.617	ND	ND
S01St08	ND	ND	ND	ND	ND	1.485	ND	ND	ND	ND	ND	ND
S01St09	0.496	ND	ND	ND	ND	1.809	ND	ND	ND	ND	ND	0.035
S01St10	ND	ND	ND	ND	ND	1.255	ND	ND	ND	ND	ND	0.064
S01BF	ND	ND	ND	ND	ND	1.741	ND	ND	ND	ND	ND	0.025
S01	*0.5*	*NQ*	*NQ*	*NQ*	*NQ*	*21.9*	*NQ*	*NQ*	*NQ*	*1.4*	*NQ*	*0.2*
S02IF	ND	ND	ND	ND	ND	1.021	ND	ND	ND	ND	ND	0.000
S02St01	ND	ND	ND	ND	ND	1.876	ND	ND	ND	ND	ND	0.143
S02St02	0.129	ND	ND	ND	ND	2.145	ND	ND	ND	ND	ND	0.027
S02St03	ND	ND	ND	ND	ND	2.615	ND	ND	ND	0.765	ND	0.086
S02St04	ND	ND	ND	ND	ND	1.971	ND	ND	ND	ND	ND	0.058
S02St05	ND	ND	ND	ND	ND	1.182	ND	ND	ND	ND	ND	0.024
S02St06	1.030	ND	ND	ND	ND	1.113	ND	ND	ND	0.791	ND	0.040
S02St07	2.656	ND	ND	ND	ND	1.939	ND	ND	ND	0.599	ND	0.078
S02St08	3.314	ND	ND	ND	ND	1.535	ND	ND	ND	ND	ND	0.052
S02St09	2.680	ND	ND	ND	ND	1.641	ND	ND	ND	ND	ND	0.077
S02St10	2.303	ND	ND	ND	ND	0.766	ND	ND	ND	ND	ND	0.029
S02BF	1.824	ND	ND	ND	ND	1.178	ND	ND	ND	ND	ND	0.033
S02	*13.9*	*NQ*	*NQ*	*NQ*	*NQ*	*19.0*	*NQ*	*NQ*	*NQ*	*2.2*	*NQ*	*0.6*
S03IF	2.539	ND	ND	ND	ND	1.191	ND	ND	ND	ND	ND	0.005
S03St01	ND	ND	ND	ND	ND	1.436	ND	ND	ND	ND	ND	ND
S03St02	ND	ND	ND	ND	ND	2.113	ND	ND	ND	0.586	ND	ND
S03St03	0.848	ND	ND	ND	ND	3.178	ND	ND	ND	1.121	ND	ND
S03St04	0.547	ND	ND	ND	ND	2.739	ND	ND	ND	0.816	ND	ND
S03St05	0.618	ND	ND	ND	ND	1.560	ND	ND	ND	1.691	ND	ND
S03St06	0.429	ND	ND	ND	ND	0.657	ND	ND	ND	1.637	ND	ND
S03St07	1.390	ND	ND	ND	ND	1.016	ND	ND	ND	1.208	ND	ND
S03St08	1.339	ND	ND	ND	ND	0.917	ND	ND	ND	0.705	ND	ND
S03St09	2.310	ND	ND	ND	ND	0.592	ND	ND	ND	ND	ND	ND
S03St10	4.182	ND	ND	ND	ND	4.612	ND	ND	ND	ND	ND	ND
S03BF	3.485	ND	ND	ND	ND	2.177	ND	ND	ND	ND	ND	0.010
S03	*17.7*	*NQ*	*NQ*	*NQ*	*NQ*	*22.2*	*NQ*	*NQ*	*NQ*	*7.8*	*NQ*	*0.0*

IF: inlet filter / BF: backup filter / ND: not detected; NQ: not quantifiable

Table A5.
Metal concentration data (ng/m3).

	Mo	Ag	Cd	In	Cs	Ba	Ta	W	Tl	Pb	Bi	U
S04IF	2.447	ND	ND	ND	ND	1.533	ND	ND	ND	ND	ND	ND
S04St01	4.065	ND	ND	ND	ND	2.066	ND	ND	ND	ND	ND	0.020
S04St02	2.339	ND	ND	ND	ND	2.523	ND	ND	ND	ND	ND	0.002
S04St03	3.474	ND	ND	ND	ND	2.883	ND	ND	ND	ND	ND	0.007
S04St04	2.805	ND	ND	ND	ND	2.576	ND	ND	ND	ND	ND	ND
S04St05	3.798	ND	0.039	ND	ND	1.661	ND	ND	ND	0.582	ND	0.063
S04St06	3.513	ND	0.097	ND	ND	2.063	ND	ND	ND	0.996	ND	0.039
S04St07	2.556	ND	0.092	ND	ND	0.510	ND	ND	ND	ND	ND	ND
S04St08	3.056	ND	0.156	ND	ND	1.167	ND	ND	ND	ND	ND	0.009
S04St09	3.023	ND	0.196	ND	ND	0.902	ND	ND	ND	ND	ND	0.018
S04St10	2.751	ND	0.060	ND	ND	1.131	ND	ND	ND	ND	ND	0.014
S04BF	3.878	ND	ND	ND	ND	1.211	ND	ND	ND	ND	ND	0.017
S04	*37.7*	*NQ*	*0.6*	*NQ*	*NQ*	*20.2*	*NQ*	*NQ*	*NQ*	*1.6*	*NQ*	*0.2*
S05IF	17.815	ND	ND	ND	ND	5.111	ND	ND	ND	ND	ND	ND
S05St01	16.942	ND	ND	ND	ND	4.780	ND	ND	ND	ND	ND	ND
S05St02	17.947	ND	ND	ND	ND	5.065	ND	ND	ND	ND	ND	ND
S05St03	18.148	ND	ND	ND	ND	5.655	ND	ND	ND	ND	ND	ND
S05St04	19.555	ND	ND	ND	ND	5.638	ND	ND	ND	ND	ND	ND
S05St05	18.206	ND	ND	ND	ND	5.020	ND	ND	ND	ND	ND	ND
S05St06	18.415	ND	ND	ND	ND	4.975	ND	ND	ND	ND	ND	ND
S05St07	18.393	ND	ND	ND	ND	4.838	ND	ND	ND	ND	ND	ND
S05St08	18.622	ND	ND	ND	ND	5.186	ND	ND	ND	ND	ND	ND
S05St09	19.167	ND	ND	ND	ND	4.912	ND	ND	ND	ND	ND	ND
S05St10	17.575	ND	ND	ND	ND	4.820	ND	ND	ND	ND	ND	ND
S05BF	18.898	ND	ND	ND	ND	5.148	ND	ND	ND	ND	ND	ND
S05	*219.7*	*NQ*	*NQ*	*NQ*	*NQ*	*61.1*	*NQ*	*NQ*	*NQ*	*NQ*	*NQ*	*NQ*
S06IF	ND	ND	ND	ND	ND	0.201	ND	ND	ND	ND	ND	ND
S06St01	ND	ND	ND	ND	ND	0.044	ND	ND	ND	ND	ND	ND
S06St02	ND	ND	ND	ND	ND	0.366	ND	ND	ND	ND	ND	ND
S06St03	ND	ND	ND	ND	ND	0.829	ND	ND	ND	ND	ND	ND
S06St04	ND	ND	ND	ND	ND	0.683	ND	ND	ND	ND	ND	ND
S06St05	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.485	ND	ND
S06St06	ND	ND	ND	ND	ND	0.202	ND	ND	ND	1.067	ND	ND
S06St07	ND	ND	ND	ND	ND	0.814	ND	ND	ND	0.949	ND	ND
S06St08	ND	ND	ND	ND	ND	0.210	ND	ND	ND	ND	ND	ND
S06St09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S06St10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S06BF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S06	*NQ*	*NQ*	*NQ*	*NQ*	*NQ*	*3.3*	*NQ*	*NQ*	*NQ*	*3.5*	*NQ*	*NQ*

IF: inlet filter / BF: backup filter / ND: not detected; NQ: not quantifiable

Table A5.
Metal concentration data (ng/m3).

	Mo	Ag	Cd	In	Cs	Ba	Ta	W	Tl	Pb	Bi	U
S07IF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S07St01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S07St02	ND	ND	ND	ND	ND	0.083	ND	ND	ND	ND	ND	ND
S07St03	ND	ND	ND	ND	ND	0.960	ND	ND	ND	ND	ND	ND
S07St04	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S07St05	ND	ND	ND	ND	ND	0.097	ND	ND	ND	ND	ND	ND
S07St06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S07St07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S07St08	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.718	ND	ND
S07St09	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.512	ND	ND
S07St10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S07BF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S07	*NQ*	*NQ*	*NQ*	*NQ*	*NQ*	*1.1*	*NQ*	*NQ*	*NQ*	*1.2*	*NQ*	*NQ*
S08IF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S08St01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S08St02	ND	ND	ND	ND	ND	2.224	ND	ND	ND	ND	ND	ND
S08St03	ND	ND	ND	ND	ND	1.533	ND	ND	ND	ND	ND	ND
S08St04	ND	ND	ND	ND	ND	0.625	ND	ND	ND	ND	ND	ND
S08St05	ND	ND	ND	ND	ND	0.146	ND	ND	ND	ND	ND	ND
S08St06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S08St07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S08St08	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S08St09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S08St10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S08BF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S08	*NQ*	*NQ*	*NQ*	*NQ*	*NQ*	*4.5*	*NQ*	*NQ*	*NQ*	*NQ*	*NQ*	*NQ*
S09IF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S09St01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S09St02	ND	ND	ND	ND	ND	0.216	ND	ND	ND	ND	ND	ND
S09St03	ND	ND	ND	ND	ND	0.123	ND	ND	ND	ND	ND	ND
S09St04	ND	ND	ND	ND	ND	0.146	ND	ND	ND	ND	ND	ND
S09St05	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.883	ND	ND
S09St06	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.371	ND	ND
S09St07	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.578	ND	ND
S09St08	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.978	ND	ND
S09St09	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S09St10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S09BF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S09	*NQ*	*NQ*	*NQ*	*NQ*	*NQ*	*0.5*	*NQ*	*NQ*	*NQ*	*13.8*	*NQ*	*NQ*

IF: inlet filter / BF: backup filter / ND: not detected; NQ: not quantifiable

Table A5.
Metal concentration data (ng/m3).

	Mo	Ag	Cd	In	Cs	Ba	Ta	W	Tl	Pb	Bi	U
S10IF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S10St01	16.809	0.183	0.030	0.157	0.218	5.276	150.414	46.655	0.205	0.410	0.191	0.137
S10St02	15.901	0.183	0.030	0.157	0.218	5.609	150.414	46.655	0.205	0.410	0.191	0.137
S10St03	18.020	0.183	0.030	0.157	0.218	7.224	150.414	46.655	0.205	0.410	0.191	0.137
S10St04	16.143	0.183	0.030	0.157	0.218	5.823	150.414	46.655	0.205	0.410	0.191	0.137
S10St05	17.264	0.183	0.030	0.157	0.218	5.511	150.414	46.655	0.205	0.410	0.191	0.137
S10St06	17.172	0.183	0.030	0.157	0.218	4.934	150.414	46.655	0.205	1.011	0.191	0.137
S10St07	16.953	0.183	0.030	0.157	0.218	5.115	150.414	46.655	0.205	1.538	0.191	0.137
S10St08	16.581	0.183	0.030	0.157	0.218	5.037	150.414	46.655	0.205	2.313	0.191	0.137
S10St09	16.488	0.183	0.030	0.157	0.218	4.877	150.414	46.655	0.205	0.410	0.191	0.137
S10St10	19.202	0.183	0.030	0.157	0.218	5.318	150.414	46.655	0.205	0.410	0.191	0.137
S10BF	18.847	0.183	0.030	0.157	0.218	5.305	150.414	46.655	0.205	0.410	0.191	0.137
S10	*189.4*	*2.0*	*0.3*	*1.7*	*2.4*	*60.0*	*1654.6*	*513.2*	*2.3*	*8.1*	*2.1*	*1.5*
S11IF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S11St01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S11St02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S11St03	ND	ND	ND	ND	ND	0.451	ND	ND	ND	ND	ND	ND
S11St04	ND	ND	ND	ND	ND	0.158	ND	ND	ND	ND	ND	ND
S11St05	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.469	ND	ND
S11St06	ND	ND	0.029	ND	ND	ND	ND	ND	ND	7.567	ND	ND
S11St07	ND	ND	0.149	ND	ND	ND	ND	ND	ND	12.313	ND	ND
S11St08	ND	ND	0.269	ND	ND	ND	ND	ND	ND	11.487	ND	ND
S11St09	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.152	ND	ND
S11St10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S11BF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S11	*NQ*	*NQ*	*0.4*	*NQ*	*NQ*	*0.6*	*NQ*	*NQ*	*NQ*	*38.0*	*NQ*	*NQ*
S12IF	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S12St01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
S12St02	ND	ND	ND	ND	ND	1.159	ND	ND	ND	ND	ND	ND
S12St03	ND	ND	ND	ND	ND	2.137	ND	ND	ND	ND	ND	ND
S12St04	ND	ND	ND	ND	ND	0.944	ND	ND	ND	ND	ND	ND
S12St05	ND	ND	ND	ND	ND	0.741	ND	ND	ND	ND	ND	ND
S12St06	0.577	ND	0.323	ND	ND	0.615	ND	ND	ND	1.429	ND	ND
S12St07	ND	ND	0.672	ND	ND	0.379	ND	ND	ND	3.005	ND	ND
S12St08	ND	ND	1.197	ND	ND	0.149	ND	ND	ND	3.329	ND	ND
S12St09	ND	ND	0.227	ND	ND	0.640	ND	ND	ND	ND	ND	ND
S12St10	ND	ND	ND	ND	ND	0.090	ND	ND	ND	ND	ND	ND
S12BF	ND	ND	ND	ND	ND	1.792	ND	ND	ND	ND	ND	ND
S12	*0.6*	*NQ*	*2.4*	*NQ*	*NQ*	*8.6*	*NQ*	*NQ*	*NQ*	*7.8*	*NQ*	*NQ*

IF: inlet filter / BF: backup filter / ND: not detected; NQ: not quantifiable

Table A5.
Metal concentration data (ng/m3).

	Mo	Ag	Cd	In	Cs	Ba	Ta	W	Tl	Pb	Bi	U
S13IF	0.555	ND	ND	ND	ND	0.393	ND	ND	ND	ND	ND	ND
S13St01	2.357	ND	0.048	ND	ND	0.699	ND	ND	ND	ND	ND	ND
S13St02	1.777	ND	0.163	ND	ND	1.082	ND	ND	ND	ND	ND	ND
S13St03	3.691	ND	0.214	ND	ND	2.453	ND	ND	ND	ND	ND	ND
S13St04	4.344	ND	0.116	ND	ND	3.412	ND	ND	ND	0.410	ND	ND
S13St05	1.584	ND	0.599	ND	ND	1.569	ND	ND	ND	1.258	ND	ND
S13St06	1.110	ND	1.492	ND	ND	1.103	ND	ND	ND	2.159	ND	ND
S13St07	1.805	ND	2.722	ND	ND	1.691	ND	ND	ND	2.549	ND	ND
S13St08	0.805	ND	3.138	ND	ND	0.797	ND	ND	ND	2.727	ND	ND
S13St09	2.156	ND	0.995	ND	ND	1.495	ND	ND	ND	1.157	ND	0.015
S13St10	1.836	ND	0.212	ND	ND	1.223	ND	ND	ND	ND	ND	ND
S13BF	0.676	ND	0.041	ND	ND	0.318	ND	ND	ND	ND	ND	ND
S13	*22.7*	*NQ*	*9.7*	*NQ*	*NQ*	*16.2*	*NQ*	*NQ*	*NQ*	*10.3*	*NQ*	*0.0*
S14IF	6.423	ND	ND	ND	ND	1.080	ND	ND	ND	ND	ND	ND
S14St01	6.289	ND	ND	ND	ND	1.125	ND	ND	ND	ND	ND	ND
S14St02	6.023	ND	ND	ND	ND	3.583	ND	ND	ND	0.413	ND	ND
S14St03	5.286	ND	ND	ND	ND	2.721	ND	ND	ND	0.467	ND	ND
S14St04	6.119	ND	ND	ND	ND	2.249	ND	ND	ND	0.961	ND	ND
S14St05	2.572	ND	0.113	ND	ND	1.790	ND	ND	ND	2.813	ND	0.003
S14St06	2.827	ND	0.184	ND	ND	0.186	ND	ND	ND	2.449	ND	ND
S14St07	2.802	ND	0.268	ND	ND	ND	ND	ND	ND	1.409	ND	0.060
S14St08	3.543	ND	0.374	ND	ND	ND	ND	ND	ND	0.698	ND	ND
S14St09	2.977	ND	0.080	ND	ND	0.780	ND	ND	ND	ND	ND	0.006
S14St10	2.354	ND	ND	ND	ND	0.623	ND	ND	ND	ND	ND	0.027
S14BF	2.801	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.006
S14	*50.0*	*NQ*	*1.0*	*NQ*	*NQ*	*14.1*	*NQ*	*NQ*	*NQ*	*9.2*	*NQ*	*0.1*
S15IF	4.399	ND	ND	ND	ND	0.979	ND	ND	ND	ND	ND	ND
S15St01	4.547	ND	ND	ND	ND	0.993	ND	ND	ND	ND	ND	ND
S15St02	3.585	ND	ND	ND	ND	1.314	ND	ND	ND	ND	ND	ND
S15St03	4.090	ND	ND	ND	ND	3.838	ND	ND	ND	0.686	ND	ND
S15St04	2.811	ND	0.033	ND	ND	1.813	ND	ND	ND	1.023	ND	ND
S15St05	3.650	ND	0.169	ND	ND	1.164	ND	ND	ND	2.149	ND	ND
S15St06	4.466	ND	0.771	ND	ND	1.060	ND	ND	ND	3.190	ND	ND
S15St07	5.765	ND	1.048	ND	ND	0.898	ND	ND	ND	2.560	ND	ND
S15St08	6.447	ND	0.850	ND	ND	1.259	ND	ND	ND	1.881	ND	ND
S15St09	4.539	ND	0.246	ND	ND	0.244	ND	ND	ND	0.429	ND	ND
S15St10	5.592	ND	0.066	ND	ND	1.159	ND	ND	ND	ND	ND	ND
S15BF	5.624	ND	ND	ND	ND	0.522	ND	ND	ND	ND	ND	ND
S15	*55.5*	*NQ*	*3.2*	*NQ*	*NQ*	*15.2*	*NQ*	*NQ*	*NQ*	*11.9*	*NQ*	*NQ*

IF: inlet filter / BF: backup filter / ND: not detected; NQ: not quantifiable

Table A5.
Metal concentration data (ng/m3).

	Mo	Ag	Cd	In	Cs	Ba	Ta	W	Tl	Pb	Bi	U
S16IF	3.692	ND	ND	ND	ND	1.106	ND	ND	ND	ND	ND	ND
S16St01	4.414	ND	ND	ND	ND	6.274	ND	ND	ND	ND	ND	ND
S16St02	5.644	ND	ND	ND	ND	1.879	ND	ND	ND	ND	ND	ND
S16St03	3.170	ND	0.059	ND	ND	2.483	ND	ND	ND	0.664	ND	ND
S16St04	5.414	ND	0.180	ND	ND	1.891	ND	ND	ND	0.964	ND	ND
S16St05	3.584	ND	0.938	ND	ND	1.427	ND	ND	ND	1.853	ND	ND
S16St06	5.907	ND	4.522	ND	ND	0.032	ND	ND	ND	4.269	ND	ND
S16St07	3.748	ND	7.362	ND	ND	ND	ND	ND	ND	3.710	ND	ND
S16St08	4.771	ND	5.135	ND	ND	0.290	ND	ND	ND	3.456	ND	ND
S16St09	4.543	ND	1.169	ND	ND	ND	ND	ND	ND	1.102	ND	ND
S16St10	5.276	ND	0.223	ND	ND	0.561	ND	ND	ND	ND	ND	ND
S16BF	5.050	ND	0.064	ND	ND	ND	ND	ND	ND	ND	ND	ND
S16	*55.2*	*NQ*	*19.7*	*NQ*	*NQ*	*15.9*	*NQ*	*NQ*	*NQ*	*16.0*	*NQ*	*NQ*

IF: inlet filter / BF: backup filter / ND: not detected; NQ: not quantifiable

Table A6.
Detection limits (DL) for metals (ng/m3).

	DL (ng/m^3)
Li	0.0002
Be	0.0008
Ti	1.7449
V	0.0706
Cr	0.9892
Mn	0.0581
Fe	4.6950
Co	0.0340
Ni	0.1752
Cu	0.1296
Zn	2.7189
Ga	0.0433
Ge	0.0000
As	0.3775
Se	0.0845
Rb	0.0632
Sr	0.2097
Mo	10.8245
Ag	0.3819
Cd	0.0627
In	0.3289
Cs	0.4554
Ba	1.2514
Ta	314.0931
W	97.4248
Tl	0.4272
Pb	0.8563
Bi	0.3984
U	0.2852

Table A7.
Distribution parameters (median, first and third quartiles) of the concentration of metals in various dimensional classes of particulate (ng/m3).

		IF >18 µm	St01 18-10 µm	St02 10-5.6 µm	St03 5.6-3.2 µm	St04 3.2-1.8 µm	St05 1.8-1.0 µm	St06 1-0.56 µm	St07 0.56-0.32 µm	St08 0.32-0.18 µm	St09 0.18-0.10 µm	St10 0.10-0.056 µm	BF <0.056 µm
Li	**Mediane**	0.053	0.077	0.100	0.118	0.061	0.072	0.056	0.082	0.075	0.071	0.048	0.045
	First quartile	0.034	0.045	0.052	0.091	0.049	0.056	0.027	0.040	0.051	0.053	0.026	0.014
	Third quartile	0.082	0.156	0.162	0.152	0.156	0.117	0.101	0.093	0.094	0.104	0.090	0.128
Ti	**Mediane**	3.642	4.726	5.650	7.754	4.647	4.253	3.628	3.420	3.619	2.915	3.786	3.057
	First quartile	2.377	3.542	5.287	6.921	3.029	2.142	1.211	1.153	2.266	1.549	2.186	2.288
	Third quartile	4.198	5.961	7.833	9.615	6.266	5.647	4.486	3.980	5.042	4.101	4.823	6.653
V	**Mediane**	0.071	0.113	0.170	0.243	0.185	0.265	0.407	0.467	0.515	0.243	0.126	0.109
	First quartile	0.060	0.086	0.147	0.186	0.139	0.173	0.333	0.388	0.454	0.139	0.081	0.063
	Third quartile	0.112	0.141	0.255	0.365	0.206	0.483	0.617	0.768	0.810	0.544	0.253	0.147
Cr	**Mediane**	0.294	0.426	0.966	0.914	0.505	0.602	0.432	0.469	0.609	0.398	0.550	1.611
	First quartile	0.182	0.216	0.416	0.736	0.224	0.463	0.195	0.362	0.434	0.163	0.323	0.366
	Third quartile	1.098	1.839	1.775	2.767	2.411	1.323	1.192	1.777	2.235	2.093	3.150	2.839
Mn	**Mediane**	0.663	1.031	1.824	2.383	1.322	1.483	1.226	0.730	0.431	0.338	0.337	0.380
	First quartile	0.449	0.694	1.471	2.191	1.062	0.972	1.027	0.537	0.335	0.288	0.225	0.160
	Third quartile	0.724	1.140	2.296	2.775	1.886	1.854	1.895	1.159	0.725	0.484	0.539	0.434
Fe	**Mediane**	20.724	31.399	61.249	110.936	60.354	30.161	14.757	9.384	6.177	4.952	5.200	6.946
	First quartile	15.277	23.982	49.752	90.952	53.640	26.981	13.233	6.495	4.138	3.690	2.242	2.766
	Third quartile	25.160	39.802	81.272	121.805	69.600	36.363	34.758	18.478	15.151	11.358	16.927	15.721
Co	**Mediane**	0.028	0.018	0.030	0.032	0.026	0.025	0.027	0.021	0.021	0.052	0.056	0.025
	First quartile	0.013	0.016	0.023	0.020	0.023	0.024	0.019	0.019	0.018	0.014	0.019	0.016
	Third quartile	0.050	0.024	0.051	0.058	0.064	0.186	0.068	0.143	0.290	0.307	0.331	0.120
Ni	**Mediane**	0.330	0.345	0.433	0.474	0.328	0.487	0.586	0.558	0.712	0.557	0.335	0.321
	First quartile	0.186	0.225	0.263	0.359	0.231	0.286	0.353	0.280	0.441	0.262	0.160	0.137
	Third quartile	0.462	0.979	0.607	0.635	0.510	1.203	0.826	0.734	1.048	1.198	0.535	0.784
Cu	**Mediane**	0.308	0.607	1.317	2.356	1.468	0.928	0.599	0.407	0.298	0.150	0.077	0.110
	First quartile	0.248	0.492	1.168	2.165	1.266	0.680	0.457	0.339	0.221	0.089	0.058	0.071
	Third quartile	0.459	0.710	1.922	3.478	1.840	1.195	0.872	0.617	0.421	0.171	0.158	0.234
Zn	**Mediane**	1.708	1.881	2.712	4.388	3.803	6.915	5.127	4.113	3.313	2.160	1.524	1.503
	First quartile	1.591	1.602	1.906	3.444	3.162	4.483	2.333	2.194	2.767	1.936	1.345	1.475
	Third quartile	2.049	2.639	3.717	6.839	5.543	9.741	8.789	5.315	3.864	2.641	2.631	2.506
Ga	**Mediane**	0.034	0.040	0.052	0.062	0.039	0.043	0.044	0.046	0.046	0.038	0.049	0.045
	First quartile	0.021	0.034	0.040	0.051	0.033	0.030	0.035	0.039	0.035	0.031	0.037	0.036
	Third quartile	0.053	0.047	0.076	0.068	0.060	0.073	0.071	0.059	0.063	0.058	0.092	0.086
Ge	**Mediane**	0.143	0.190	0.187	0.196	0.210	0.194	0.171	0.190	0.180	0.199	0.192	0.169
	First quartile	0.049	0.081	0.117	0.115	0.150	0.086	0.127	0.082	0.140	0.130	0.139	0.140
	Third quartile	0.188	0.264	0.239	0.284	0.307	0.204	0.229	0.215	0.251	0.239	0.231	0.242
Se	**Mediane**	0.080	0.109	0.107	0.142	0.127	0.272	0.448	0.379	0.446	0.231	0.197	0.153
	First quartile	0.014	0.047	0.035	0.082	0.079	0.183	0.278	0.201	0.277	0.146	0.071	0.120
	Third quartile	0.144	0.154	0.237	0.246	0.144	0.594	0.696	0.633	0.798	0.779	0.318	0.420

IF: inlet filter / BF: backup filter

Table A7.

Distribution parameters (median, first and third quartiles) of the concentration of metals in various dimensional classes of particulate (ng/m3).

		IF >18 µm	St01 18-10 µm	St02 10-5.6 µm	St03 5.6-3.2 µm	St04 3.2-1.8 µm	St05 1.8-1.0 µm	St06 1-0.56 µm	St07 0.56-0.32 µm	St08 0.32-0.18 µm	St09 0.18-0.10 µm	St10 0.10-0.056 µm	BF <0.056 µm
Rb	**Mediane**	0.121	0.143	0.202	0.217	0.147	0.180	0.198	0.190	0.169	0.111	0.109	0.111
	First quartile	0.064	0.109	0.164	0.188	0.133	0.114	0.104	0.116	0.121	0.062	0.088	0.070
	Third quartile	0.134	0.160	0.346	0.282	0.197	0.266	0.398	0.376	0.307	0.152	0.151	0.137
Sr	**Mediane**	0.564	0.832	1.232	1.217	0.723	0.679	0.517	0.613	0.602	0.645	0.657	0.610
	First quartile	0.290	0.533	0.867	0.624	0.241	0.185	0.250	0.417	0.515	0.524	0.498	0.513
	Third quartile	0.761	1.185	1.503	1.420	0.911	0.819	0.749	0.761	0.856	0.791	0.822	1.110
Mo	**Mediane**	3.692	4.547	4.614	3.890	4.879	3.617	3.170	2.802	3.543	3.000	4.182	3.878
	First quartile	2.493	4.239	2.199	3.398	2.809	2.325	1.050	2.556	3.056	2.403	2.354	2.801
	Third quartile	5.411	11.549	8.493	8.469	8.625	7.165	5.547	5.765	6.447	4.542	5.592	5.624
Cd	**Mediane**	NQ	0.039	0.096	0.059	0.074	0.141	0.254	0.470	0.612	0.227	0.066	0.041
	First quartile	NQ	0.035	0.063	0.045	0.032	0.057	0.081	0.135	0.241	0.138	0.060	0.035
	Third quartile	NQ	0.044	0.129	0.137	0.132	0.491	0.951	1.466	1.683	0.621	0.212	0.052
Ba	**Mediane**	1.050	1.673	2.113	2.549	1.971	1.560	1.082	1.063	1.167	1.198	1.159	1.741
	First quartile	0.953	1.059	1.121	1.390	0.814	1.164	0.512	0.835	0.543	0.675	0.694	1.178
	Third quartile	1.170	3.423	2.391	3.203	2.657	1.790	2.067	1.877	1.510	1.767	2.934	2.177
Pb	**Mediane**	NQ	0.410	0.413	0.675	0.889	1.588	1.637	2.044	2.520	0.807	0.410	0.410
	First quartile	NQ	0.410	0.411	0.516	0.512	0.977	1.011	1.143	1.009	0.450	0.410	0.410
	Third quartile	NQ	0.410	0.500	0.745	0.963	2.075	3.190	3.181	3.241	1.143	0.410	0.410
U	**Mediane**	0.003	0.078	0.028	0.086	0.058	0.044	0.040	0.078	0.052	0.027	0.029	0.021
	First quartile	0.002	0.019	0.021	0.047	0.033	0.019	0.030	0.069	0.030	0.016	0.027	0.012
	Third quartile	0.004	0.138	0.056	0.111	0.097	0.081	0.064	0.107	0.094	0.066	0.064	0.031

IF: inlet filter / BF: backup filter

Table A8
Carbon concentration data (ug/m3)

	OC	ΔOC	EC	ΔEC	TC	ΔTC
S01IF	0.04	0.01	0.00	0.00	0.04	0.01
S01St01	0.06	0.01	0.00	0.00	0.06	0.01
S01St02	0.25	0.02	0.00	0.00	0.25	0.02
S01St03	0.39	0.02	0.00	0.00	0.39	0.03
S01St04	0.24	0.02	0.01	0.00	0.25	0.02
S01St05	0.26	0.02	0.02	0.00	0.28	0.02
S01St06	0.52	0.03	0.04	0.00	0.56	0.04
S01St07	0.55	0.03	0.09	0.01	0.64	0.04
S01St08	0.43	0.03	0.09	0.01	0.52	0.03
S01St09	0.36	0.02	0.05	0.00	0.41	0.03
S01St10	0.15	0.01	0.03	0.00	0.18	0.02
S01BF	0.23	0.02	0.06	0.01	0.29	0.02
S01	*3.50*	*0.07*	*0.39*	*0.02*	*3.88*	*0.09*
S02IF	0.02	0.01	0.00	0.00	0.02	0.01
S02St01	0.05	0.01	0.00	0.00	0.05	0.01
S02St02	0.24	0.02	0.00	0.00	0.24	0.02
S02St03	0.37	0.02	0.00	0.00	0.38	0.02
S02St04	0.25	0.02	0.01	0.00	0.26	0.02
S02St05	0.24	0.02	0.04	0.00	0.28	0.02
S02St06	0.39	0.03	0.08	0.01	0.48	0.03
S02St07	0.30	0.02	0.10	0.01	0.40	0.03
S02St08	0.25	0.02	0.06	0.01	0.31	0.02
S02St09	0.21	0.02	0.06	0.01	0.27	0.02
S02St10	0.09	0.01	0.03	0.00	0.12	0.01
S02BF	0.08	0.01	0.04	0.00	0.12	0.01
S02	*2.49*	*0.06*	*0.42*	*0.02*	*2.91*	*0.07*
S03IF	0.03	0.01	0.00	0.00	0.03	0.01
S03St01	0.12	0.01	0.00	0.00	0.12	0.01
S03St02	0.34	0.02	0.01	0.00	0.35	0.02
S03St03	0.33	0.02	0.01	0.00	0.35	0.02
S03St04	0.19	0.01	0.01	0.00	0.20	0.02
S03St05	0.32	0.02	0.05	0.00	0.37	0.03
S03St06	0.40	0.03	0.03	0.00	0.43	0.03
S03St07	0.46	0.03	0.07	0.01	0.53	0.03
S03St08	NQ	NQ	NQ	NQ	NQ	NQ
S03St09	NQ	NQ	NQ	NQ	NQ	NQ
S03St10	0.10	0.01	0.02	0.00	0.13	0.01
S03BF	NQ	NQ	NQ	NQ	NQ	NQ
S03	*2.30*	*NQ*	*0.20*	*NQ*	*2.51*	*NQ*
S04IF	0.03	0.01	0.00	0.00	0.03	0.01
S04St01	0.07	0.01	0.00	0.00	0.07	0.01
S04St02	0.22	0.01	0.00	0.00	0.22	0.02
S04St03	0.28	0.02	0.01	0.00	0.28	0.02
S04St04	0.14	0.01	0.01	0.00	0.16	0.01
S04St05	0.27	0.02	0.05	0.00	0.32	0.02
S04St06	0.41	0.03	0.09	0.01	0.49	0.03
S04St07	0.37	0.02	0.12	0.01	0.49	0.03
S04St08	0.25	0.02	0.07	0.01	0.33	0.02
S04St09	0.28	0.02	0.05	0.01	0.34	0.03
S04St10	0.11	0.01	0.02	0.00	0.14	0.02
S04BF	0.11	0.01	0.04	0.00	0.15	0.02
S04	*2.54*	*0.06*	*0.46*	*0.02*	*3.00*	*0.07*

IF: inlet filter / BF: backup filter / NQ: not quantiable

Carbon concentration data (ug/m3)

	OC	ΔOC	EC	ΔEC	TC	ΔTC
S05IF	0.02	0.01	0.00	0.00	0.02	0.01
S05St01	0.12	0.01	0.00	0.00	0.13	0.01
S05St02	0.22	0.02	0.00	0.00	0.22	0.02
S05St03	0.35	0.02	0.00	0.00	0.35	0.02
S05St04	0.18	0.01	0.01	0.00	0.19	0.02
S05St05	0.29	0.02	0.06	0.01	0.35	0.03
S05St06	0.50	0.03	0.06	0.01	0.56	0.04
S05St07	0.33	0.02	0.07	0.01	0.40	0.03
S05St08	0.21	0.02	0.08	0.01	0.29	0.02
S05St09	0.24	0.02	0.05	0.00	0.28	0.02
S05St10	0.09	0.01	0.02	0.00	0.11	0.01
S05BF	0.11	0.01	0.04	0.00	0.15	0.02
S05	*2.65*	*0.06*	*0.39*	*0.02*	*3.04*	*0.08*
S06IF	0.07	0.01	0.00	0.00	0.07	0.01
S06St01	0.19	0.01	0.00	0.00	0.19	0.02
S06St02	0.42	0.03	0.00	0.00	0.42	0.03
S06St03	0.47	0.03	0.00	0.00	0.48	0.03
S06St04	0.24	0.02	0.01	0.00	0.25	0.02
S06St05	0.48	0.03	0.08	0.01	0.57	0.04
S06St06	0.81	0.05	0.13	0.01	0.94	0.06
S06St07	0.53	0.03	0.09	0.01	0.61	0.04
S06St08	0.42	0.03	0.14	0.01	0.56	0.04
S06St09	0.20	0.02	0.08	0.01	0.27	0.02
S06St10	0.08	0.01	0.02	0.00	0.11	0.01
S06BF	0.06	0.01	0.04	0.00	0.10	0.01
S06	*3.97*	*0.08*	*0.60*	*0.02*	*4.57*	*0.10*
S07IF	0.05	0.01	0.00	0.00	0.05	0.01
S07St01	0.22	0.01	0.00	0.00	0.22	0.02
S07St02	0.45	0.03	0.00	0.00	0.45	0.03
S07St03	0.51	0.03	0.00	0.00	0.52	0.03
S07St04	0.22	0.02	0.01	0.00	0.23	0.02
S07St05	0.34	0.02	0.06	0.01	0.40	0.03
S07St06	0.57	0.03	0.13	0.01	0.70	0.04
S07St07	0.39	0.02	0.09	0.01	0.48	0.03
S07St08	0.28	0.02	0.08	0.01	0.36	0.03
S07St09	0.24	0.02	0.04	0.00	0.27	0.02
S07St10	0.06	0.01	0.03	0.00	0.09	0.01
S07BF	0.01	0.01	0.02	0.00	0.04	0.01
S07	*3.34*	*0.07*	*0.46*	*0.02*	*3.80*	*0.09*
S08IF	0.06	0.01	0.00	0.00	0.06	0.01
S08St01	0.22	0.01	0.00	0.00	0.22	0.02
S08St02	0.45	0.03	0.00	0.00	0.45	0.03
S08St03	0.34	0.02	0.00	0.00	0.34	0.02
S08St04	0.18	0.01	0.00	0.00	0.18	0.01
S08St05	0.23	0.02	0.04	0.00	0.28	0.02
S08St06	0.41	0.03	0.05	0.00	0.46	0.03
S08St07	0.27	0.02	0.11	0.01	0.37	0.03
S08St08	0.23	0.02	0.11	0.01	0.34	0.02
S08St09	0.24	0.02	0.04	0.00	0.27	0.02
S08St10	0.07	0.01	0.02	0.00	0.09	0.01
S08BF	0.03	0.01	0.02	0.00	0.05	0.01
S08	*2.73*	*0.06*	*0.38*	*0.01*	*3.11*	*0.07*

IF: inlet filter / BF: backup filter / NQ: not quantiable

Carbon concentration data (ug/m3)

	OC	ΔOC	EC	ΔEC	TC	ΔTC
S09IF	0.01	0.00	0.00	0.00	0.01	0.01
S09St01	0.06	0.01	0.00	0.00	0.06	0.01
S09St02	0.16	0.01	0.00	0.00	0.16	0.01
S09St03	NQ	NQ	NQ	NQ	NQ	NQ
S09St04	0.11	0.01	0.02	0.00	0.14	0.01
S09St05	0.23	0.02	0.07	0.01	0.30	0.02
S09St06	0.37	0.02	0.07	0.01	0.44	0.03
S09St07	0.32	0.02	0.14	0.01	0.46	0.03
S09St08	0.25	0.02	0.11	0.01	0.36	0.03
S09St09	0.27	0.02	0.07	0.01	0.34	0.02
S09St10	0.20	0.02	0.04	0.00	0.24	0.02
S09BF	0.02	0.01	0.03	0.00	0.05	0.01
S09	*2.02*	*NQ*	*0.55*	*NQ*	*2.57*	*NQ*
S10IF	0.01	0.00	0.00	0.00	0.02	0.01
S10St01	0.13	0.01	0.00	0.00	0.13	0.01
S10St02	0.29	0.02	0.00	0.00	0.29	0.02
S10St03	0.52	0.03	0.02	0.00	0.54	0.03
S10St04	0.22	0.01	0.03	0.00	0.25	0.02
S10St05	0.76	0.04	0.08	0.01	0.83	0.05
S10St06	1.24	0.07	0.10	0.01	1.34	0.07
S10St07	1.29	0.07	0.18	0.01	1.47	0.08
S10St08	0.71	0.04	0.14	0.01	0.85	0.05
S10St09	0.36	0.02	0.04	0.00	0.40	0.03
S10St10	0.07	0.01	0.04	0.00	0.11	0.01
S10BF	0.06	0.01	0.04	0.00	0.09	0.01
S10	*5.67*	*0.12*	*0.67*	*0.02*	*6.34*	*0.14*
S11IF	0.04	0.01	0.00	0.00	0.04	0.01
S11St01	0.08	0.01	0.00	0.00	0.08	0.01
S11St02	0.22	0.01	0.00	0.00	0.22	0.02
S11St03	0.46	0.03	0.01	0.00	0.47	0.03
S11St04	0.25	0.02	0.01	0.00	0.26	0.02
S11St05	0.68	0.04	0.10	0.01	0.78	0.04
S11St06	0.97	0.05	0.05	0.00	1.02	0.06
S11St07	0.89	0.05	0.04	0.00	0.93	0.05
S11St08	0.61	0.04	0.04	0.00	0.65	0.04
S11St09	0.21	0.02	0.07	0.01	0.28	0.02
S11St10	0.06	0.01	0.05	0.00	0.11	0.01
S11BF	0.12	0.01	0.02	0.00	0.13	0.01
S11	*4.59*	*0.10*	*0.38*	*0.01*	*4.98*	*0.11*
S12IF	0.05	0.01	0.00	0.00	0.05	0.01
S12St01	0.08	0.01	0.00	0.00	0.08	0.01
S12St02	0.20	0.01	0.00	0.00	0.20	0.02
S12St03	0.32	0.02	0.00	0.00	0.32	0.02
S12St04	0.14	0.01	0.01	0.00	0.15	0.01
S12St05	0.30	0.02	0.06	0.01	0.36	0.02
S12St06	0.58	0.03	0.03	0.00	0.61	0.04
S12St07	0.36	0.02	0.03	0.00	0.39	0.03
S12St08	0.38	0.02	0.04	0.00	0.42	0.03
S12St09	0.12	0.01	0.03	0.00	0.15	0.01
S12St10	0.04	0.01	0.02	0.00	0.06	0.01
S12BF	0.03	0.01	0.02	0.00	0.05	0.01
S12	*2.59*	*0.06*	*0.24*	*0.01*	*2.84*	*0.07*

IF: inlet filter / BF: backup filter / NQ: not quantiable

Table A8
Carbon concentration data (ug/m3)

	OC	ΔOC	EC	ΔEC	TC	ΔTC
S13IF	0.00	0.00	0.00	0.00	0.00	0.00
S13St01	0.03	0.00	0.00	0.00	0.03	0.01
S13St02	0.18	0.01	0.00	0.00	0.18	0.01
S13St03	0.28	0.02	0.01	0.00	0.29	0.02
S13St04	0.14	0.01	0.01	0.00	0.15	0.01
S13St05	0.27	0.02	0.08	0.01	0.35	0.02
S13St06	0.31	0.02	0.06	0.01	0.37	0.03
S13St07	0.41	0.03	0.05	0.00	0.46	0.03
S13St08	0.34	0.02	0.06	0.00	0.39	0.03
S13St09	0.15	0.01	0.07	0.01	0.21	0.02
S13St10	0.06	0.01	0.02	0.00	0.07	0.01
S13BF	0.04	0.01	0.02	0.00	0.06	0.01
S13	*2.20*	*0.05*	*0.38*	*0.01*	*2.58*	*0.06*
S14IF	0.00	0.00	0.00	0.00	0.00	0.01
S14St01	0.04	0.01	0.00	0.00	0.05	0.01
S14St02	0.20	0.01	0.01	0.00	0.20	0.02
S14St03	0.27	0.02	0.01	0.00	0.27	0.02
S14St04	0.13	0.01	0.02	0.00	0.15	0.01
S14St05	0.48	0.03	0.09	0.01	0.57	0.03
S14St06	0.49	0.03	0.09	0.01	0.58	0.04
S14St07	0.54	0.03	0.07	0.01	0.61	0.04
S14St08	0.42	0.03	0.05	0.00	0.47	0.03
S14St09	0.10	0.01	0.05	0.00	0.15	0.02
S14St10	0.05	0.01	0.01	0.00	0.06	0.01
S14BF	0.06	0.01	0.02	0.00	0.08	0.01
S14	*2.78*	*0.07*	*0.41*	*0.01*	*3.19*	*0.08*
S15IF	0.02	0.00	0.00	0.00	0.02	0.01
S15St01	0.07	0.01	0.00	0.00	0.08	0.01
S15St02	0.16	0.01	0.01	0.00	0.17	0.01
S15St03	0.22	0.01	0.01	0.00	0.23	0.02
S15St04	0.16	0.01	0.01	0.00	0.17	0.01
S15St05	0.45	0.03	0.03	0.00	0.48	0.03
S15St06	0.83	0.05	0.02	0.00	0.85	0.05
S15St07	0.86	0.05	0.03	0.00	0.89	0.06
S15St08	0.56	0.03	0.03	0.00	0.58	0.04
S15St09	0.18	0.01	0.03	0.00	0.21	0.02
S15St10	0.04	0.01	0.03	0.00	0.07	0.01
S15BF	0.02	0.01	0.02	0.00	0.03	0.01
S15	*3.56*	*0.08*	*0.21*	*0.01*	*3.77*	*0.10*
S16IF	0.00	0.00	0.00	0.00	0.00	0.01
S16St01	0.05	0.01	0.00	0.00	0.05	0.01
S16St02	0.14	0.01	0.01	0.00	0.14	0.01
S16St03	0.24	0.02	0.01	0.00	0.25	0.02
S16St04	0.14	0.01	0.02	0.00	0.16	0.02
S16St05	0.53	0.03	0.05	0.00	0.57	0.04
S16St06	0.90	0.05	0.05	0.01	0.94	0.06
S16St07	0.85	0.05	0.03	0.00	0.88	0.05
S16St08	0.51	0.03	0.03	0.00	0.54	0.04
S16St09	0.17	0.02	0.05	0.01	0.23	0.02
S16St10	0.05	0.01	0.04	0.01	0.09	0.01
S16BF	0.02	0.01	0.03	0.00	0.05	0.01
S16	*3.59*	*0.09*	*0.32*	*0.01*	*3.91*	*0.10*

IF: inlet filter / BF: backup filter / NQ: not quantiable

Table A9

Distribution parameters (median, first and third quartiles) of the concentration of carbon in various dimensional classes of particulate (ug/m3)

		OC			EC			TC		
		Mediane	First quartile	Third quartile	Mediane	First quartile	Third quartile	Mediane	First quartile	Third quartile
IF	**>18 μm**	0.023	0.014	0.044	0.000	0.000	0.001	0.023	0.015	0.044
St01	**18-10 μm**	0.075	0.060	0.126	0.000	0.000	0.001	0.076	0.060	0.132
St02	**10-5.6 μm**	0.222	0.194	0.306	0.001	0.000	0.004	0.224	0.197	0.308
St03	**5.6-3.2 μm**	0.341	0.276	0.427	0.005	0.002	0.013	0.346	0.286	0.430
St04	**3.2-1.8 μm**	0.179	0.141	0.225	0.012	0.010	0.015	0.186	0.155	0.247
St05	**1.8-1.0 μm**	0.311	0.266	0.481	0.061	0.046	0.077	0.365	0.313	0.566
St06	**1-0.56 μm**	0.509	0.406	0.816	0.061	0.043	0.087	0.566	0.473	0.870
St07	**0.56-0.32 μm**	0.435	0.350	0.629	0.079	0.046	0.098	0.510	0.445	0.701
St08	**0.32-0.18 μm**	0.380	0.252	0.469	0.075	0.046	0.099	0.420	0.348	0.549
St09	**0.18-0.10 μm**	0.213	0.177	0.254	0.049	0.041	0.062	0.274	0.222	0.310
St10	**0.10-0.056 μm**	0.072	0.054	0.093	0.025	0.022	0.033	0.107	0.084	0.121
BF	**<0.056 μm**	0.058	0.025	0.092	0.027	0.020	0.037	0.082	0.050	0.124

IF: inlet filter

BF: backup filter

Table A10.
PAHs concentration data (ng/m3).

	NAP	ACY	ACE	FL	PHE	ANT	FLA	PYR	BaA	CHR	BbF	BkF	BaP	BghiP	IcdP	DahA
S17IF	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S17St01	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S17St02	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S17St03	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S17St04	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S17St05	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S17St06	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S17St07	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S17St08	ND	ND	0.134	0.014	ND	0.010	DET	ND	DET	DET	DET	0.011	ND	ND	ND	ND
S17St09	0.371	ND	ND	0.089	2.276	ND	ND	0.041	ND	ND	0.014	DET	0.003	ND	ND	0.003
S17St10	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S17BF	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S18IF	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S18St01	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S18St02	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S18St03	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S18St04	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S18St05	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S18St06	ND	0.066	ND	0.015	ND	ND	ND	DET	ND	1.492	0.502	0.117	DET	0.027	DET	0.025
S18St07	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S18St08	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S18St09	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S18St10	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S18BF	ND	ND	ND	ND	0.241	0.227	0.040	ND	0.007	DET	ND	ND	ND	0.001	ND	0.005
S19IF	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S19St01	ND	ND	0.019	ND	ND	ND	NQ	ND	0.002	ND	ND	ND	0.007	DET	DET	0.001
S19St02	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S19St03	ND	ND	ND	0.010	0.114	ND	NQ	0.007	0.001	0.018	ND	0.001	0.001	ND	0.001	ND
S19St04	0.039	ND	ND	0.008	ND	ND	NQ	ND	ND	ND	0.008	0.005	0.027	ND	DET	ND
S19St05	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
S19St06	0.140	ND	ND	ND	ND	ND	NQ	ND	ND	ND	0.221	0.196	0.244	0.150	ND	0.233
S19St07	0.161	ND	ND	0.007	0.125	ND	NQ	ND	0.003	0.065	0.032	DET	ND	0.027	ND	0.044
S19St08	0.060	ND	0.021	ND	0.094	ND	NQ	0.012	ND	0.273	0.015	0.008	0.025	ND	ND	0.002
S19St09	0.008	ND	ND	ND	0.208	0.206	NQ	ND	ND	0.113	ND	ND	ND	ND	ND	DET
S19St10	0.050	ND	ND	0.009	ND	ND	NQ	ND	0.002	0.097	0.003	ND	ND	0.001	0.001	0.001
S19BF	0.042	ND	ND	ND	ND	ND	NQ	ND	ND	0.093	ND	ND	0.019	ND	ND	0.002

IF: inlet filter / BF: backup filter / NQ: not quantifiable / ND: not detected / DET: detected

Table A10.
PAHs concentration data (ng/m3).

	NAP	ACY	ACE	FL	PHE	ANT	FLA	PYR	BaA	CHR	BbF	BkF	BaP	BghiP	IcdP	DahA
S20IF	0.000	ND	0.000	0.000	ND	ND	ND	ND	DET	0.001	DET	ND	0.001	DET	ND	ND
S20St01	0.000	ND	0.000	0.000	0.007	0.000	ND	DET	0.000	0.001	0.001	ND	0.000	0.005	DET	ND
S20St02	0.000	ND	0.000	0.000	ND	ND	ND	DET	0.001	0.000	DET	ND	0.000	0.002	0.000	ND
S20St03	0.000	ND	0.000	0.025	0.050	0.010	ND	ND	ND	0.000	ND	0.000	DET	0.001	0.000	ND
S20St04	0.000	ND	0.000	0.000	0.000	ND	ND	DET	ND	0.003	ND	ND	0.000	0.002	0.000	0.000
S20St05	0.000	DET	0.000	0.004	0.030	0.000	ND	ND	ND	0.000	ND	0.001	DET	0.002	0.001	0.000
S20St06	ND	0.003	0.000	0.000	0.004	0.000	DET	0.014	ND	ND	0.007	0.003	DET	0.006	0.004	DET
S20St07	0.007	0.010	0.140	0.034	0.159	0.045	ND	0.063	ND	ND	ND	0.012	ND	0.018	DET	0.001
S20St08	0.000	ND	0.000	0.000	0.004	0.000	0.122	DET	ND	ND	DET	DET	ND	0.016	0.004	0.000
S20St09	0.000	0.011	ND	0.008	0.025	0.000	ND	0.031	0.001	0.010	0.001	0.000	DET	0.005	0.000	0.001
S20St10	0.145	DET	ND	0.000	0.053	ND	ND	0.000	0.002	0.007	0.001	ND	0.000	0.002	0.000	ND
S20BF	0.000	ND	0.000	0.000	0.000	0.000	DET	0.000	ND	0.000	ND	0.000	0.000	DET	0.000	0.000

IF: inlet filter / BF: backup filter / NQ: not quantifiable / ND: not detected / DET: detected

Table A11.
Daily average meteorological conditions.

Date	WS_aver	RH (%)_aver	T (°C)_aver	WS_err	RH (%)_err	T (°C)_err	Prevalent Direction
06/09/18	1.260	69.175	24.051	0.087	2.654	0.852	ESE
07/09/18	0.833	75.101	22.169	0.177	2.171	0.469	N.D.
08/09/18	0.535	70.602	24.142	0.056	2.824	0.721	N
09/09/18	0.677	70.251	24.422	0.082	2.539	0.631	ESE
10/09/18	0.746	74.754	24.727	0.100	1.694	0.502	ESE
11/09/18	0.766	73.651	25.613	0.103	1.892	0.500	ESE
12/09/18	0.864	74.930	25.412	0.086	1.785	0.494	ESE
13/09/18	0.709	77.836	25.129	0.099	1.376	0.381	N.D.
14/09/18	0.673	81.385	24.594	0.082	2.125	0.501	N.D.
15/09/18	0.733	75.513	24.144	0.096	2.533	0.622	N.D.
16/09/18	0.647	69.003	24.856	0.054	2.869	0.634	N.D.
17/09/18	0.621	72.860	24.668	0.076	2.225	0.558	N.D.
18/09/18	0.765	77.415	24.372	0.086	1.642	0.456	ESE
19/09/18	0.511	75.169	24.644	0.062	2.270	0.565	N.D.
20/09/18	0.633	65.404	25.577	0.060	3.022	0.722	NNE
21/09/18	0.738	66.414	25.264	0.082	2.060	0.591	ESE
22/09/18	1.042	75.442	23.624	0.104	1.615	0.653	NE
23/09/18	0.909	72.538	22.011	0.088	1.593	0.646	NE
24/09/18	1.357	61.667	21.488	0.168	4.431	0.381	ENE
25/09/18	1.171	42.141	18.058	0.056	2.469	0.630	NE
26/09/18	1.017	46.959	15.771	0.082	2.273	0.566	N.D.
27/09/18	0.849	59.984	17.341	0.119	1.925	0.730	N.D.
28/09/18	0.702	54.525	20.334	0.090	2.258	0.873	N
29/09/18	1.308	50.955	20.712	0.041	1.224	0.593	ENE
30/09/18	0.843	49.594	17.142	0.083	2.132	0.500	NE
01/10/18	1.452	79.365	13.679	0.155	1.935	0.248	NE
02/10/18	1.029	62.079	16.177	0.125	2.642	0.607	NE
03/10/18	0.566	66.522	16.207	0.061	2.375	0.655	N.D.
04/10/18	0.933	63.603	18.093	0.091	2.550	0.780	NE
05/10/18	0.916	62.194	18.075	0.077	2.904	0.736	NE
06/10/18	1.237	86.488	16.844	0.068	1.534	0.208	NNE
07/10/18	0.630	88.318	18.019	0.089	1.299	0.296	ESE
08/10/18	0.427	84.074	19.102	0.049	1.886	0.491	N
09/10/18	0.713	73.083	20.106	0.058	2.572	0.600	NE
10/10/18	0.826	68.210	19.938	0.072	2.451	0.655	NE
11/10/18	0.616	68.345	19.122	0.089	2.107	0.587	NE
12/10/18	0.406	72.940	19.433	0.048	2.009	0.501	NNE
13/10/18	0.728	70.400	19.045	0.065	2.442	0.640	NE
14/10/18	0.689	68.334	18.960	0.065	2.247	0.598	NE
15/10/18	0.790	71.911	18.122	0.026	1.027	0.390	NE
16/10/18	0.666	71.475	18.351	0.057	1.748	0.454	NE
17/10/18	0.647	76.301	18.250	0.031	0.837	0.260	NE
18/10/18	0.599	75.750	18.834	0.067	1.892	0.492	N
19/10/18	0.684	68.909	19.031	0.059	2.760	0.634	NE
20/10/18	0.671	71.991	18.164	0.076	2.207	0.543	NE
21/10/18	0.990	75.373	15.063	0.121	1.427	0.491	ENE
22/10/18	0.888	65.364	14.219	0.052	2.566	0.675	ENE
23/10/18	1.168	64.570	15.750	0.103	1.737	0.574	SW
24/10/18	0.672	76.093	14.696	0.082	1.622	0.588	ENE
25/10/18	0.673	79.257	16.007	0.035	2.135	0.535	NE
26/10/18	0.657	79.261	16.789	0.029	1.031	0.294	NE
27/10/18	1.206	80.687	17.575	0.167	1.202	0.446	N.D.
28/10/18	2.764	80.009	18.798	0.252	1.185	0.277	ESE
29/10/18	1.471	86.695	17.651	0.198	2.086	0.330	ENE
30/10/18	1.067	70.351	15.491	0.153	1.731	0.360	SSW
31/10/18	0.862	80.462	14.147	0.050	1.981	0.544	NE
01/11/18	0.973	91.006	15.177	0.108	0.708	0.344	NE
02/11/18	0.972	93.987	15.256	0.072	0.419	0.056	NE
03/11/18	0.510	84.982	16.848	0.054	1.709	0.429	NNE

WS: wind speed (m/s); RH: relative humidity; T: temperature
N.D.: not defined prevalent wind direction

Table A11.
Daily average meteorological conditions.

Date	WS_aver	RH (%)_aver	T (°C)_aver	WS_err	RH (%)_err	T (°C)_err	Prevalent Direction
04/11/18	0.935	80.986	17.239	0.057	1.490	0.339	NE
05/11/18	1.021	92.147	15.631	0.083	0.479	0.217	NE
06/11/18	0.511	90.371	17.309	0.036	1.297	0.347	NE
07/11/18	0.522	90.146	16.972	0.051	1.262	0.341	NE
08/11/18	0.405	93.313	14.284	0.049	0.192	0.117	N.D.
09/11/18	0.544	96.261	13.225	0.046	0.242	0.097	N.D.
10/11/18	0.708	88.148	13.419	0.064	0.933	0.138	N
11/11/18	0.671	84.873	14.804	0.050	0.719	0.189	NNE
12/11/18	0.943	88.179	14.209	0.121	0.877	0.205	WSW
13/11/18	1.525	88.525	14.681	0.136	0.244	0.075	SW
14/11/18	0.534	85.808	14.041	0.064	2.356	0.506	NNE
15/11/18	0.862	73.933	12.644	0.055	2.230	0.385	NE
16/11/18	1.549	62.975	11.119	0.073	2.108	0.280	ENE
17/11/18	1.848	53.891	10.194	0.082	1.849	0.299	ENE
18/11/18	1.570	56.908	7.889	0.089	1.357	0.302	ENE
19/11/18	1.937	68.337	6.606	0.139	1.281	0.216	NE
20/11/18	2.393	81.154	6.423	0.258	1.665	0.323	NE
21/11/18	0.941	83.660	8.432	0.126	1.494	0.370	N.D.
22/11/18	0.639	84.849	9.701	0.086	0.896	0.142	NNW
23/11/18	0.847	88.365	10.676	0.124	1.249	0.185	NE
24/11/18	0.869	95.573	11.871	0.098	0.169	0.235	N.D.
25/11/18	0.831	94.468	11.468	0.054	0.460	0.087	N
26/11/18	0.713	90.521	11.036	0.112	0.444	0.093	N.D.
27/11/18	1.112	79.279	10.728	0.045	2.155	0.241	NNE

WS: wind speed (m/s); RH: relative humidity; T: temperature
N.D.: not defined prevalent wind direction

Table A12.
Daily average particle concentrations in number and in mass.

Date	Conc D<0.25 µm (#/cm^3)	Conc D>0.25 µm (#/cm^3)	PM_{10} (ug/m^3)	$PM_{2.5}$ (ug/m^3)	PM_1 (ug/m^3)
06/09/2018	9627.40	148.81	15.03	13.26	11.95
07/09/2018	10395.60	137.98	17.22	13.92	11.44
08/09/2018	9371.93	219.68	22.27	19.01	16.93
09/09/2018	7642.41	219.26	22.14	18.96	16.87
10/09/2018	8701.42	313.79	30.22	26.60	23.97
11/09/2018	8593.61	367.40	36.01	31.20	28.04
12/09/2018	8096.72	479.88	45.26	39.82	36.31
13/09/2018	8813.73	697.28	63.25	56.14	51.80
14/09/2018	5976.48	766.08	70.00	64.16	59.14
15/09/2018	10788.24	366.10	35.96	31.17	28.10
16/09/2018	7312.85	333.48	30.00	26.53	24.46
17/09/2018	9566.42	404.21	35.40	31.89	29.60
18/09/2018	8598.73	483.31	43.23	38.31	35.12
19/09/2018	7966.37	390.71	36.19	32.06	28.79
20/09/2018	10939.91	306.24	30.99	26.02	23.07
21/09/2018	10240.44	313.20	31.50	26.67	23.94
22/09/2018	10305.48	398.67	38.91	32.91	29.09
23/09/2018	12789.57	174.97	24.77	18.39	13.48
24/09/2018	8129.90	166.86	28.45	19.72	13.61
25/09/2018	7699.38	20.36	6.46	3.80	2.13
26/09/2018	8138.55	39.41	8.79	5.77	3.84
27/09/2018	12739.58	190.99	27.46	20.19	16.04
28/09/2018	16022.52	146.50	22.67	16.11	12.77
29/09/2018	14354.84	94.23	17.22	12.13	8.79
30/09/2018	9206.38	49.89	11.21	7.46	4.95
01/10/2018	10135.01	123.38	16.67	13.41	10.80
02/10/2018	12523.39	34.89	6.09	4.43	3.26
03/10/2018	12722.40	142.16	15.57	13.48	11.76
04/10/2018	17721.66	121.44	15.21	12.52	10.50
05/10/2018	17580.48	125.50	15.42	13.04	11.03
06/10/2018	14767.94	197.20	22.12	19.39	16.41
07/10/2018	11691.62	152.80	16.19	14.08	11.97
08/10/2018	13768.94	294.58	26.66	23.90	21.62
09/10/2018	10612.07	393.77	35.82	31.23	28.46
10/10/2018	10645.21	465.56	42.56	37.39	34.19
11/10/2018	10057.95	423.07	39.09	34.68	32.01
12/10/2018	12291.74	564.93	50.72	44.75	41.15
13/10/2018	12623.23	526.58	48.27	42.37	38.69
14/10/2018	10190.48	411.84	39.00	34.19	31.40
15/10/2018	12714.48	423.24	41.16	35.42	32.30
16/10/2018	13716.67	372.94	35.97	31.29	28.28
17/10/2018	12456.67	315.51	32.23	27.19	23.73
18/10/2018	13271.26	457.64	41.43	36.54	33.05
19/10/2018	12596.89	504.67	46.97	41.04	37.25
20/10/2018	8196.89	526.40	45.85	41.23	38.12
21/10/2018	9388.14	360.44	32.32	28.79	26.05
22/10/2018	10021.99	109.84	14.07	11.19	9.14
23/10/2018	11556.97	210.14	23.43	19.38	16.95
24/10/2018	13068.31	409.50	43.38	36.59	33.02
25/10/2018	10415.98				
26/10/2018	11295.29				
27/10/2018	7746.42				
28/10/2018	3637.08				
29/10/2018	4559.48				
30/10/2018	7703.85	27.62	7.41	4.75	2.83
31/10/2018	13228.00	97.65	15.57	11.66	8.85
01/11/2018	9366.66	94.67	31.37	21.58	10.15
02/11/2018	14448.39	122.45	20.51	15.30	10.61
03/11/2018	13694.30	101.08	15.32	11.05	8.62
04/11/2018	9444.93	165.89	24.94	18.31	13.54
05/11/2018	11448.61	219.70	31.05	24.47	18.03

Table A12.
Daily average particle concentrations in number and in mass.

Date	Conc D<0.25 µm (#/cm^3)	Conc D>0.25 µm (#/cm^3)	PM_{10} (ug/m^3)	$PM_{2.5}$ (ug/m^3)	PM_1 (ug/m^3)
06/11/2018	11871.99	184.97	29.18	22.46	15.43
07/11/2018	10680.46	290.00	31.74	26.52	21.45
08/11/2018	7812.55	409.03	37.41	34.34	31.55
09/11/2018	4336.54	261.00	22.82	22.08	20.99
10/11/2018	6926.09	263.56	26.45	24.42	22.15
11/11/2018	10328.39	356.37	32.75	29.96	27.50
12/11/2018	8880.80	454.47	39.86	37.26	34.71
13/11/2018	6349.86	370.86	36.33	33.92	31.09
14/11/2018	12060.44	279.08	27.72	24.07	21.91
15/11/2018	10885.08	222.82	22.44	19.26	17.51
16/11/2018	6434.84	150.08	16.97	13.88	11.90
17/11/2018	6691.13	101.62	15.68	11.05	8.55
18/11/2018	5922.12	139.27	16.19	13.10	11.23
19/11/2018	7178.26	210.52	18.39	17.28	16.42
20/11/2018	10124.86	66.94	7.63	6.63	5.84
21/11/2018	12158.22	391.32	32.41	29.92	28.50
22/11/2018	13700.30	467.79	40.38	37.41	35.41
23/11/2018	12877.91	432.04	36.83	34.14	32.22
24/11/2018	11497.00	235.49	21.84	19.86	17.85
25/11/2018	14060.00	271.85	25.38	22.94	21.03
26/11/2018	11006.54	280.54	24.13	22.36	21.10
27/11/2018	12373.87	147.85	14.99	13.30	12.24

Table A13.
Average size distributions in number and in mass.

Diameter min (µm)	Diameter max (µm)	Diameter average (µm)	**Average Particle number ($\#/cm^3$)**	**Average Particle mass ($\mu g/m^3$)**
0.009	0.25	0.12	**10430**	**0.96**
0.25	0.28	0.265	**91.26**	**1.84**
0.28	0.3	0.29	**72.95**	**1.98**
0.3	0.35	0.325	**53.05**	**1.97**
0.35	0.4	0.375	**34.14**	**1.95**
0.4	0.45	0.425	**15.75**	**1.31**
0.45	0.5	0.475	**6.03**	**0.70**
0.5	0.58	0.54	**6.19**	**1.06**
0.58	0.65	0.615	**1.91**	**0.50**
0.65	0.7	0.675	**0.49**	**0.18**
0.7	0.8	0.75	**0.51**	**0.25**
0.8	1	0.9	**0.23**	**0.20**
1	1.3	1.15	**0.18**	**0.33**
1.3	1.6	1.45	**0.10**	**0.35**
1.6	2	1.8	**0.12**	**0.86**
2	2.5	2.25	**0.08**	**1.10**
2.5	3	2.75	**0.05**	**1.11**
3	3.5	3.25	**0.02**	**0.80**
3.5	4	3.75	**0.01**	**0.75**
4	5	4.5	**0.01**	**1.25**
5	6.5	5.75	**0.00**	**0.47**
6.5	7.5	7	**0.00**	**0.11**
7.5	8.5	8	**0.00**	**0.07**
8.5	10	9.25	**0.00**	**0.06**
10	12.5	11.25	**0.00**	**0.05**
12.5	15	13.75	**0.00**	**0.03**
15	17.5	16.25	**0.00**	**0.02**
17.5	20	18.75	**0.00**	**0.01**
20	25	22.5	**0.00**	**0.03**
25	30	27.5	**0.00**	**0.05**
30	32	31	**0.00**	**0.03**