

Appendix FW-1-R. Results for Reference System, February 21-27, 2014.

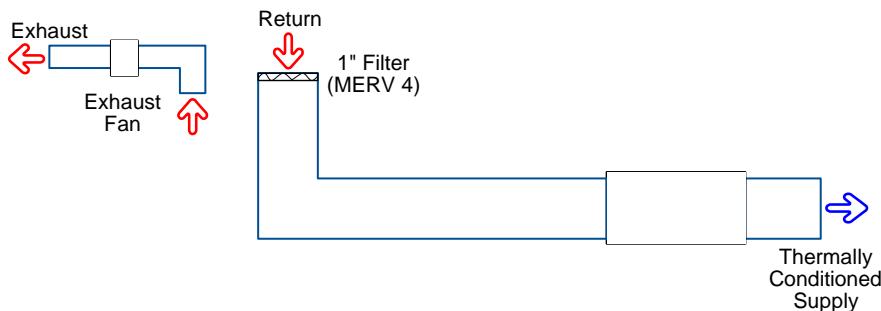


Table FW-1-R-1. Description of **Reference System** component characteristics including during the period of **February 21-27, 2014**

System Parameter	Description or Measured Value
Heating	75,000 BTU/h, 80% eff., gas furnace, 1-stage burner
Cooling	3 ton, SEER13 air conditioner
Thermal distribution	Central fan with PSC motor: 1200 cfm for cooling, 1074 cfm for heating
Ventilation	Exhaust fan in main bathroom with ECM; Set to 38 cfm continuous
Filtration	MERV4, 1" (Purolator F312) filter installed at return air ceiling grill of forced air furnace. Some particle removal as air infiltrates through building envelope to replace air exiting home through continuous exhaust fan in bathroom.
Recirculation blower schedule	As required for thermal conditioning, no fan cycler.
VOC removal system	None

Notes about this monitoring period

One of the Metone instruments dropped out early in the operating period. The Metone indoor / outdoor data stream was constructed using both instruments until the problem occurred and the remaining instrument afterward. The DustTrak instruments experienced intermittent communications issues at the beginning of the operational period. All of the other instruments were functioning normally.

The 24 h running statistics in the figures starts at 2/20/2014 19:00. We were in the house to trouble shoot the DustTraks and censored the Metones' largest channel from 2/21/2014 19:00 to 2/22/2014 22:00.

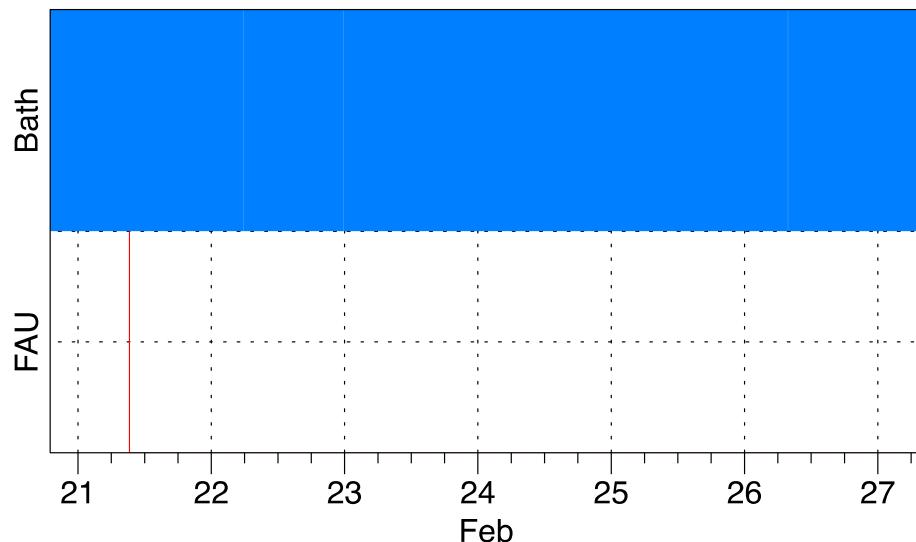


Figure FW-1-R-1. Operation of mechanical systems: Bath exhaust fan; fan on central forced air unit (FAU).

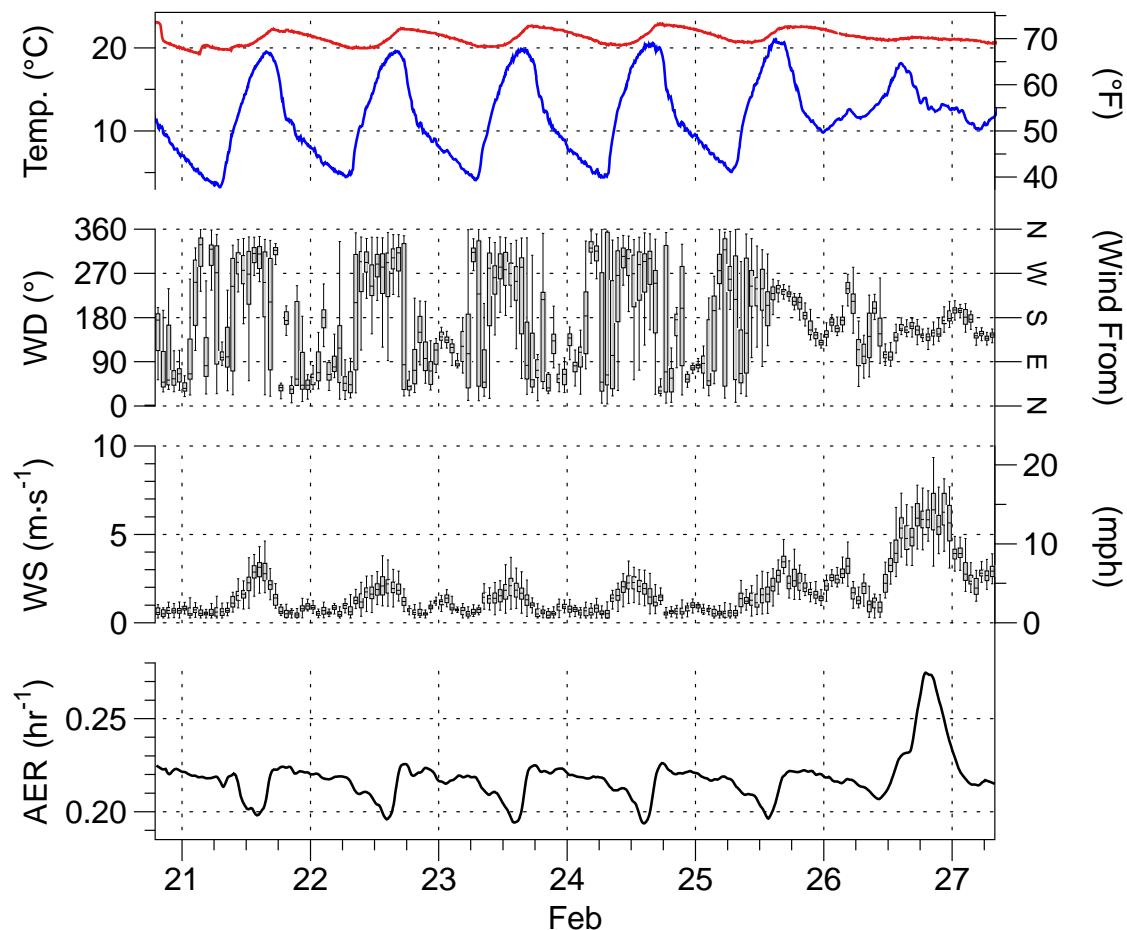


Figure FW-1-R-2. Environmental parameters measured during operation of Reference System, Feb 21-27, 2014. From top to bottom: indoor (red) and outdoor (blue) temperatures, wind direction (WD) in units of degrees from North, wind speed (WS), and air exchange rate (AER). For WD and WS, the box for each hour shows the 25th, 50th and 75th percentiles of the measured values and whiskers extend 1.5X the interquartile range (75th–25th percentile values) above the 75th and below the 25th percentile values.

Guide to plots of pollutant concentration time series and indoor / outdoor (I/O) ratios

The bottom section of each plot shows outdoor and indoor time series using the resolution of data collection: 3-min for black carbon and 1-min for all other parameters. The top and bottom of grey band are LOESS-smoothed, 1-min (or 3-min for black carbon) time-series. Also shown are time series with 1h and 24h time averaging for most pollutants. Triangles in bottom of plot indicate the highest 1h outdoor and corresponding highest 1h indoor average during each day. The top section of each plot shows the ratio of indoor to outdoor running 24h mean values (8h for ozone) and the ratios of highest 1h indoor to corresponding highest 1h outdoor concentration each day.

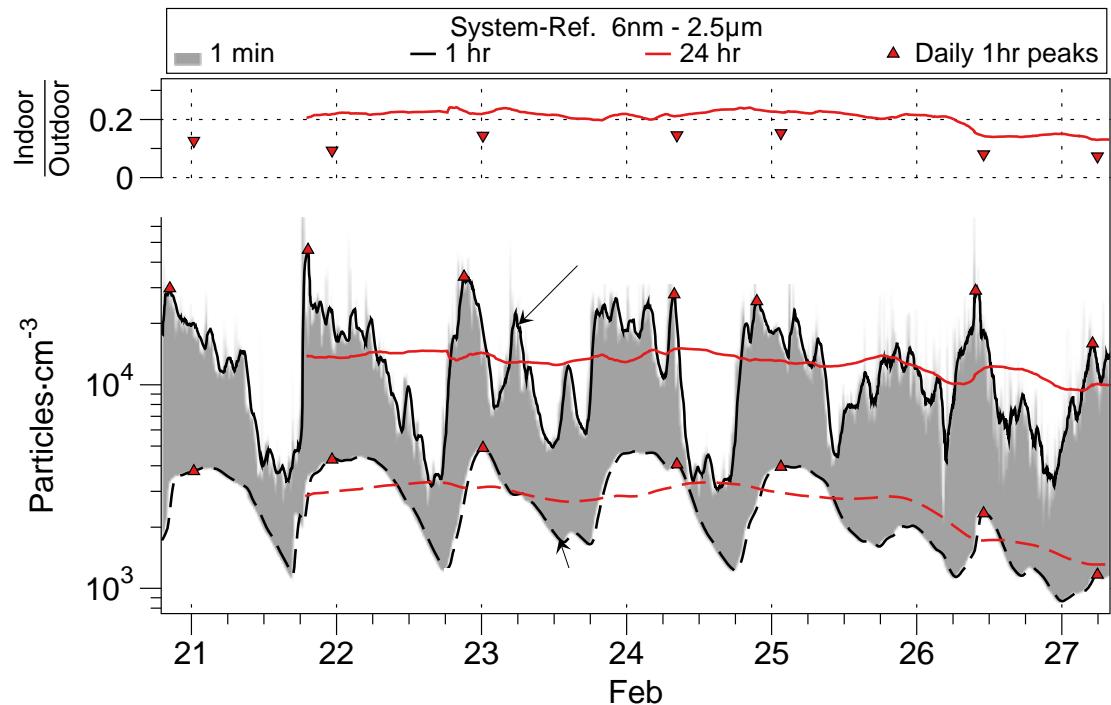


Figure FW-1-R-3. Number concentrations of 6 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of Reference System, Feb 21-27, 2014. Data collected using TSI 3787 CPCs.

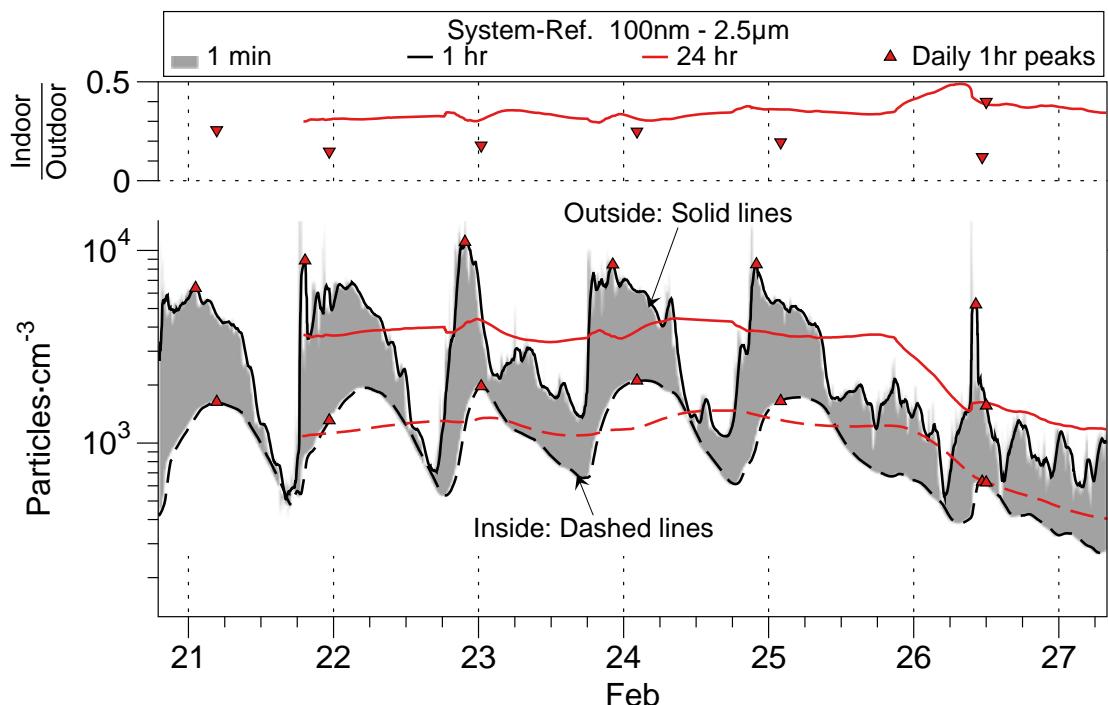


Figure FW-1-R-4. Number concentrations of 100 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of Reference System, Feb 21-27, 2014. Data collected using TSI 3781 CPCs outfitted with screens to exclude particles smaller than 100 nm. Refer to "Guide" before Figure FW-1-R-3.

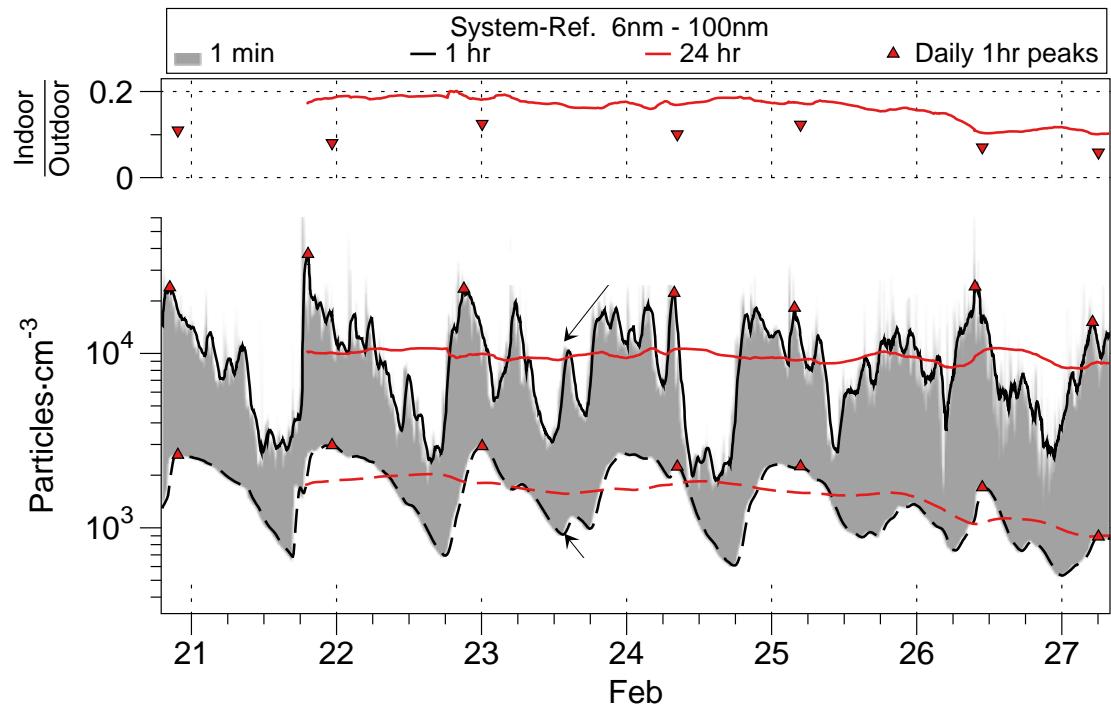


Figure FW-1-R-5. Number concentrations of 6–100 nm diameter particles measured outdoors and indoors during operation of Reference System, Feb 21–27, 2014. Data obtained as the difference between time series shown in prior two figures. Refer to “Guide” before Figure FW-1-R-3.

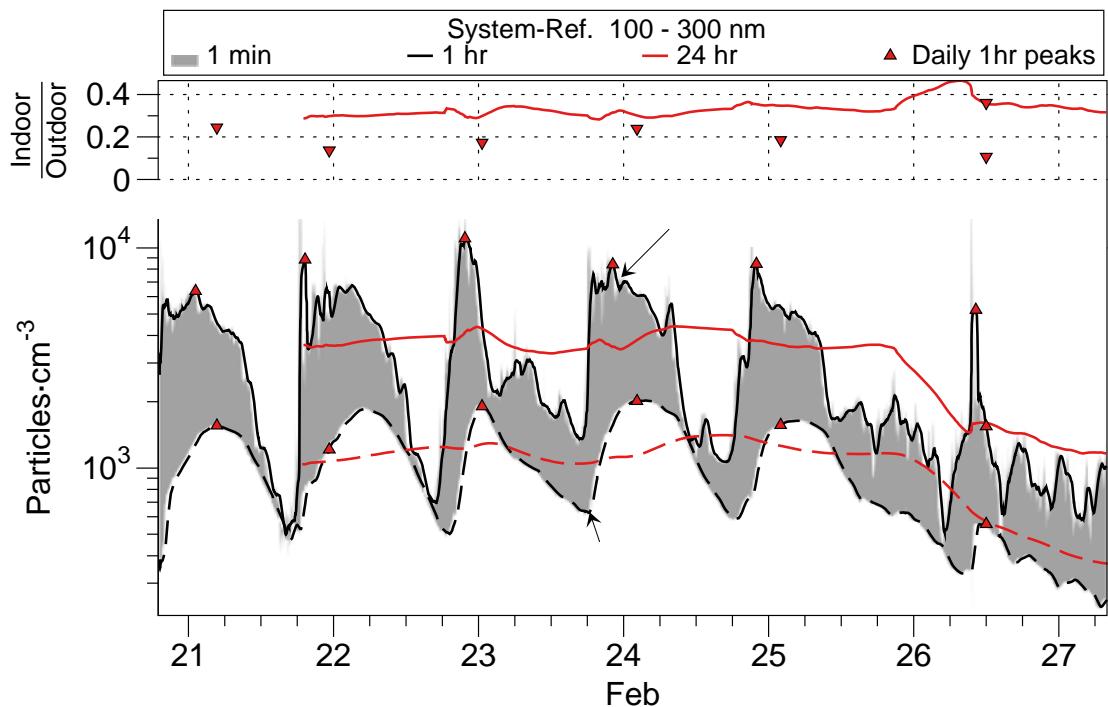


Figure FW-1-R-6. Number concentrations of 100–300 nm diameter particles measured outdoors and indoors during operation of Reference System, Feb 21–27, 2014. Data obtained as the difference between the TSI 3781 CPC with size selector and the MetOne BT637S OPC. Refer to “Guide” before Figure FW-1-R-3.

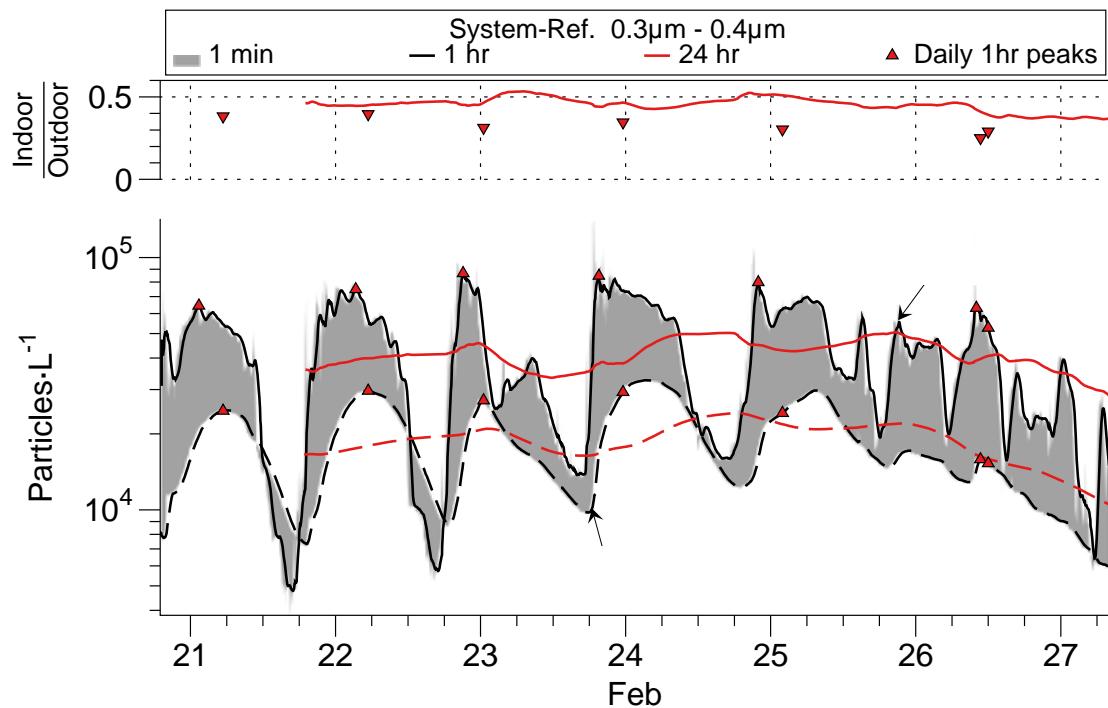


Figure FW-1-R-7. Number concentrations of $0.3\text{--}0.4\mu\text{m}$ diameter particles measured outdoors and indoors during operation of Reference System, Feb 21-27, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-1-R-3.

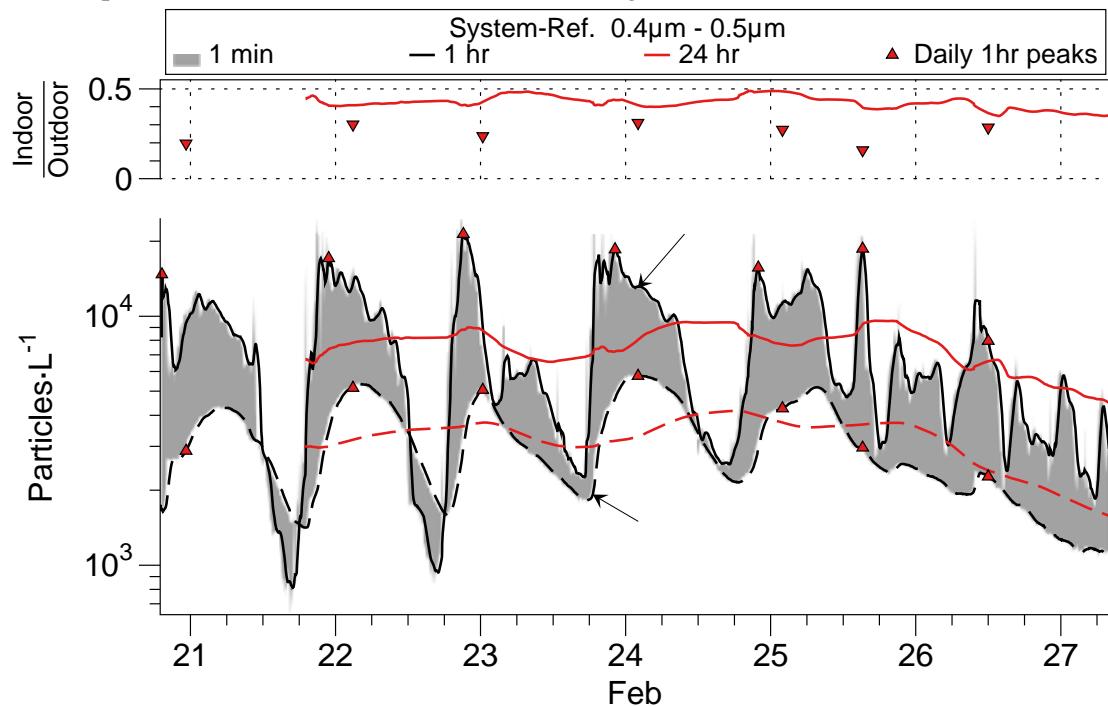


Figure FW-1-R-8. Number concentrations of $0.4\text{--}0.5\mu\text{m}$ diameter particles measured outdoors and indoors during operation of Reference System, Feb 21-27, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-1-R-3.

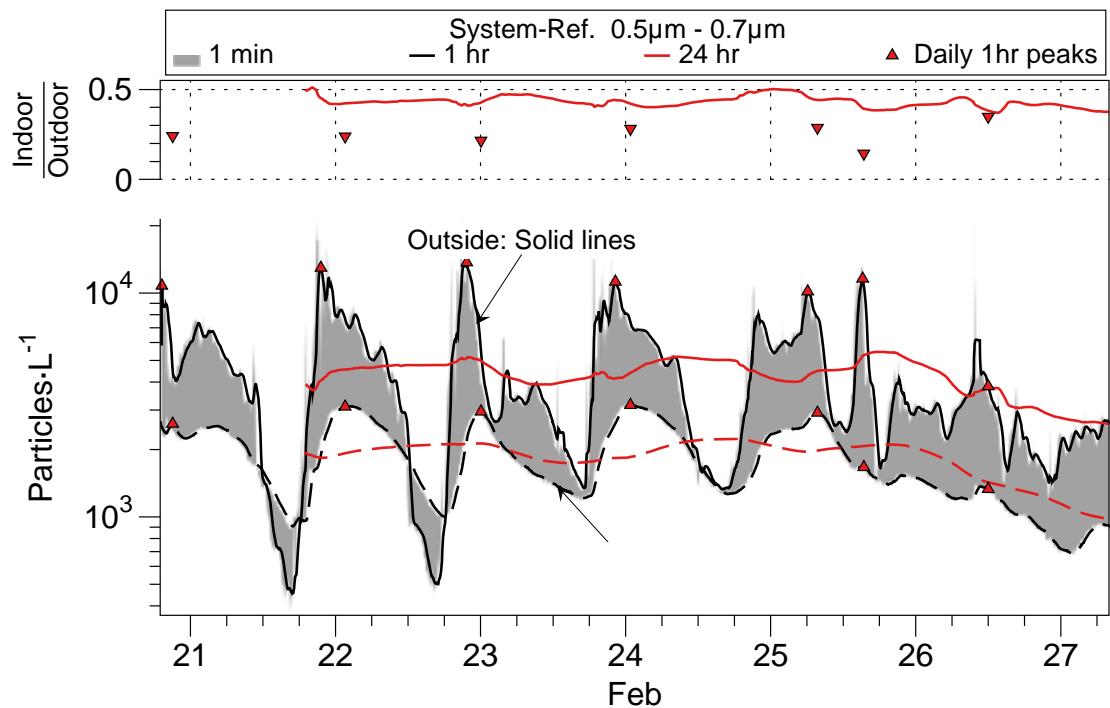


Figure FW-1-R-9. Number concentrations of 0.5–0.7 μm diameter particles measured outdoors and indoors during operation of Reference System, Feb 21–27, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-1-R-3.

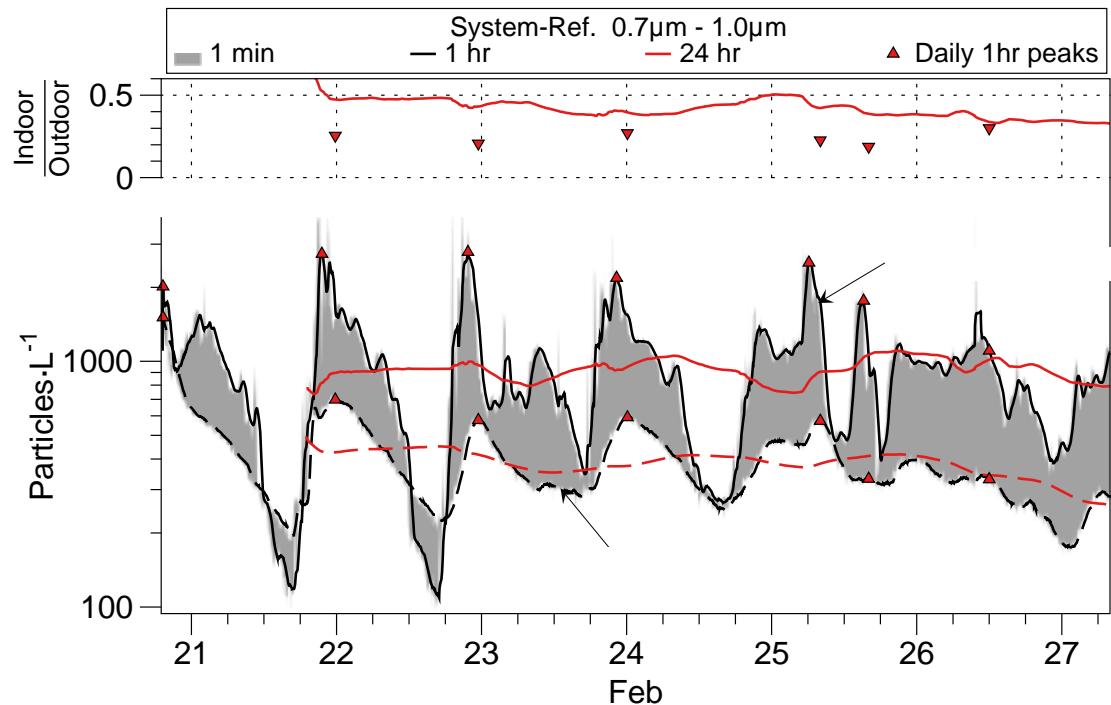


Figure FW-1-R-10. Number concentrations of $0.7\text{--}1.0\ \mu\text{m}$ diameter particles measured outdoors and indoors during operation of Reference System, Feb 21-27, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-1-R-3.

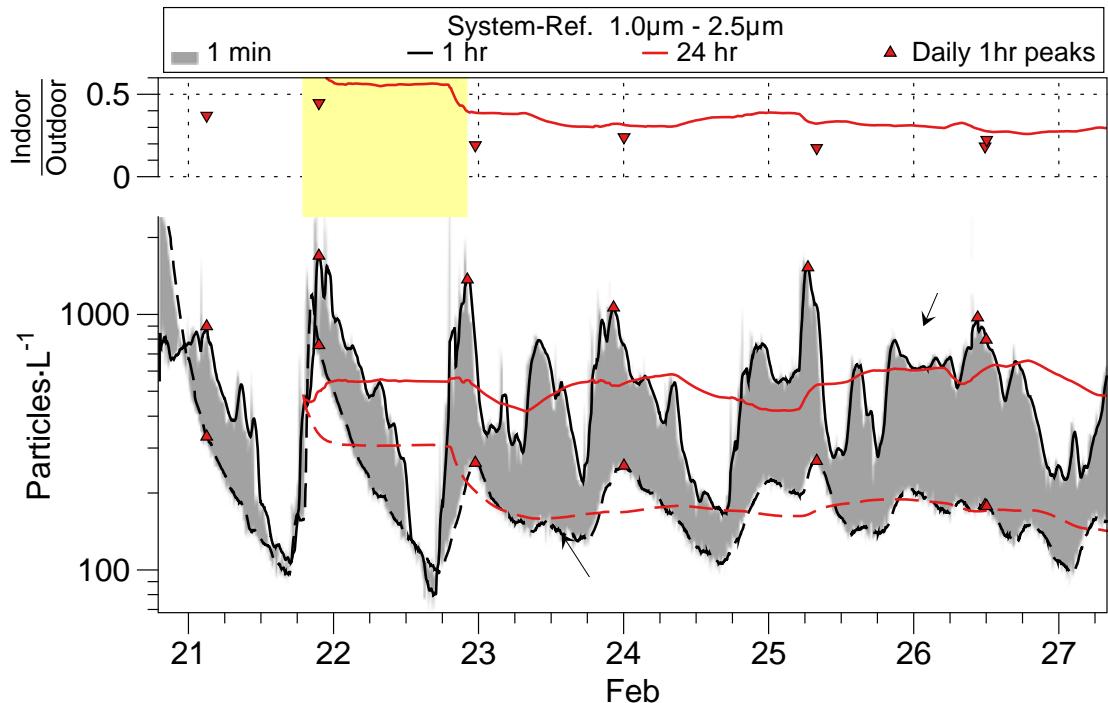


Figure FW-1-R-11. Number concentrations of $1.0\text{--}2.5\ \mu\text{m}$ diameter particles measured outdoors and indoors during operation of Reference System, Feb 21-27, 2014. Data collected using MetOne BT637S particle counters. Refer to Figure FW-1-R-3 for details. The yellow band indicates censored data due to in house activity.

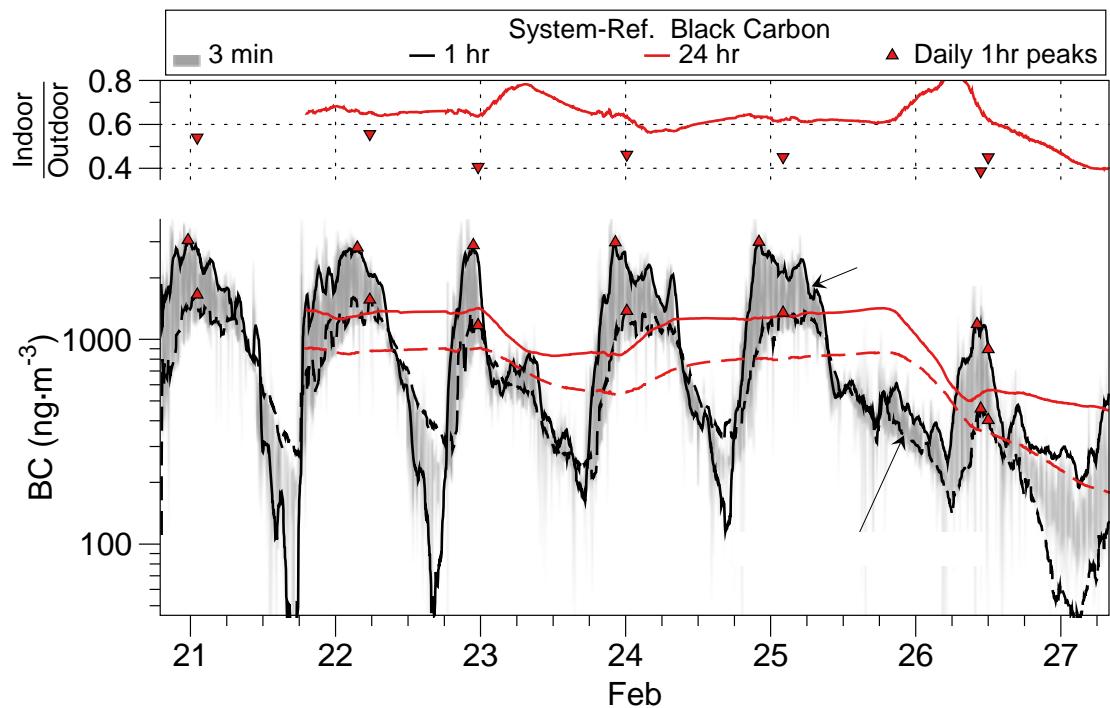


Figure FW-1-R-12. Black carbon concentrations measured outdoors and indoors during operation of Reference System, Feb 21-27, 2014. Data collected using AE22 Aethalometers with 3-min samples. Data otherwise as described in Figure FW-1-R-3 caption.

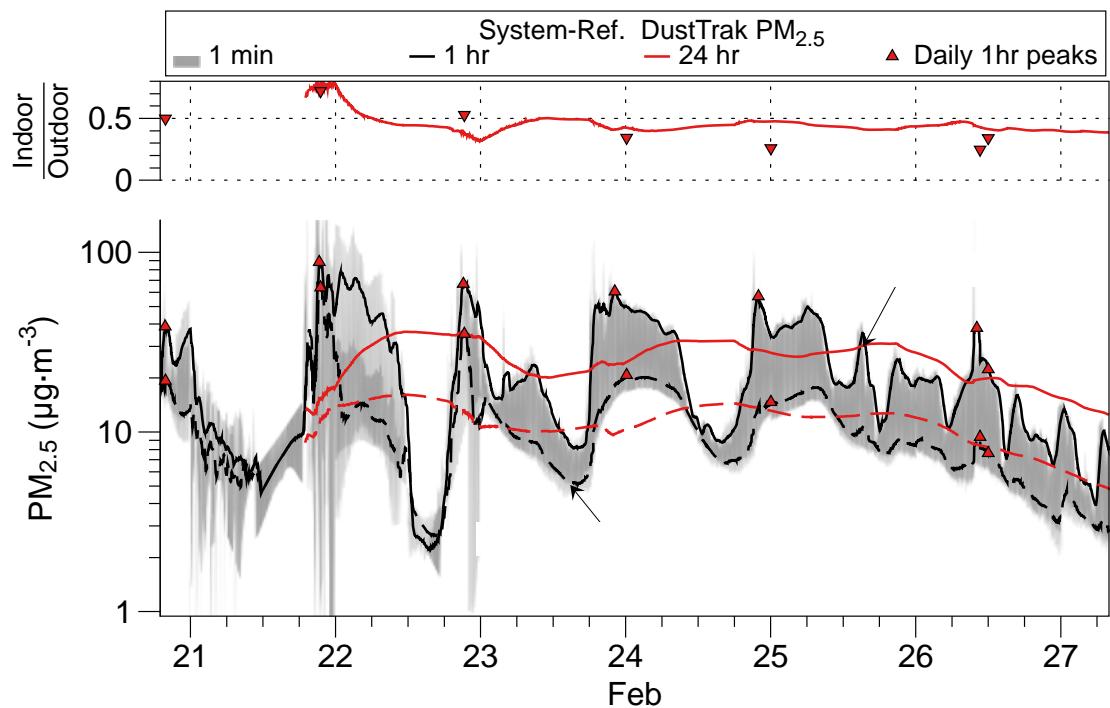


Figure FW-1-R-13. PM_{2.5} reported by TSI DustTrak II 8530 measurements outdoors and indoors during operation of Reference System, Feb 21-27, 2014. The DustTrak measures light scattering and uses a calibration to estimate PM_{2.5} mass. Refer to “Guide” before Figure FW-1-R-3.

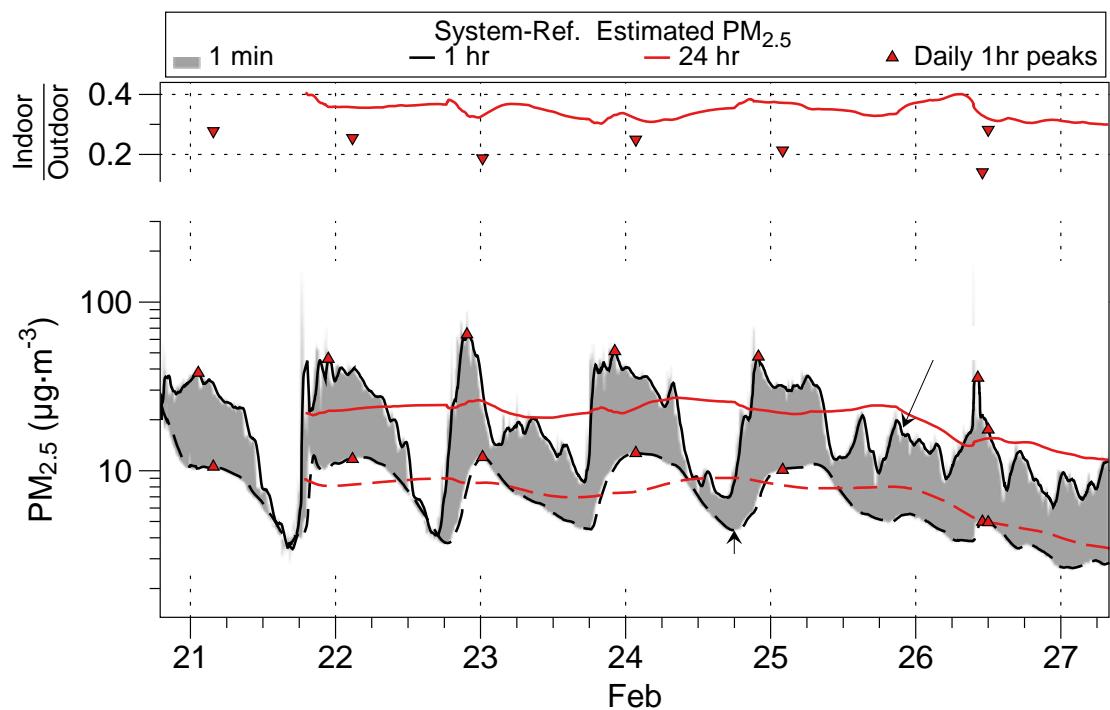


Figure FW-1-R-14. Estimated PM_{2.5} concentration calculated from size-resolved particle number concentrations measured by MetOne and CPC during operation of Reference System, Feb 21-27, 2014. Details provided in body of report. Refer to “Guide” before Figure FW-1-R-3.

Table FW-1-R-2. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor/outdoor ratios for particles with aerodynamic diameters 6 nm to 2.5 micron measured using the TSI 3787 CPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.5E+4	1.5E+4	1.3E+4	1.5E+4	1.3E+4	1.2E+4	7.9E+3	1.3E+4	2.4E+3
Outdoor 24 SD	6.8E+3	1.3E+4	9.2E+3	8.1E+3	7.4E+3	7.1E+3	4.0E+3	7.9E+3	2.4E+3
Indoor 24h mean	3.3E+3	3.3E+3	2.7E+3	3.3E+3	2.8E+3	1.7E+3	1.2E+3	2.6E+3	7.8E+2
Indoor 24 SD	5.9E+2	1.1E+3	1.1E+3	1.2E+3	1.0E+3	3.1E+2	2.8E+2	7.9E+2	3.6E+2
24h mean In/Out	0.16	0.22	0.23	0.21	0.23	0.20	0.14	0.20	0.03
Highest 8h Outdoor	2.8E+4	2.4E+4	2.1E+4	2.1E+4	2.0E+4	1.5E+4	1.6E+4	2.1E+4	4.3E+3
Highest 8h Indoor	3.3E+3	4.3E+3	4.0E+3	4.6E+3	3.9E+3	1.8E+3	1.8E+3	3.4E+3	1.1E+3
Highest 8 h In/Out	0.12	0.18	0.19	0.21	0.20	0.12	0.11	0.16	0.04
Highest 1h Outdoor	3.0E+4	4.6E+4	3.4E+4	2.8E+4	2.6E+4	2.9E+4	1.6E+4	3.0E+4	8.4E+3
Highest 1h Indoor ²	3.3E+3	4.3E+3	4.0E+3	4.6E+3	3.9E+3	1.8E+3	1.8E+3	3.5E+3	1.2E+3
Highest 1h In/Out	0.13	0.09	0.14	0.15	0.15	0.08	0.07	0.12	0.03
Time of highest 1h Outdoor	2/20/14 20:24	2/21/14 19:16	2/22/14 21:07	2/24/14 7:52	2/24/14 21:32	2/26/14 9:44	2/27/14 5:05		
Corresponding highest 1h Indoor	2/21/14 0:24	2/21/14 23:16	2/23/14 0:13	2/24/14 8:19	2/25/14 1:32	2/26/14 11:04	2/27/14 5:54		

¹ Based on 24h periods starting / ending at noon. Day 1 starts at 2/20/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-1-R-3. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor/outdoor ratios for particles with aerodynamic diameters 100 nm to 2.5 micron measured using the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	4.4E+3	3.9E+3	3.3E+3	4.4E+3	3.6E+3	1.6E+3	9.0E+2	3.2E+3	1.3E+3
Outdoor 24 SD	1.5E+3	3.2E+3	2.9E+3	2.4E+3	2.1E+3	1.7E+3	2.3E+2	2.0E+3	9.1E+2
Indoor 24h mean	1.3E+3	1.3E+3	1.1E+3	1.5E+3	1.2E+3	6.3E+2	3.8E+2	1.0E+3	3.6E+2
Indoor 24 SD	3.1E+2	5.0E+2	4.1E+2	5.5E+2	4.1E+2	1.5E+2	8.5E+1	3.5E+2	1.6E+2
24h mean In/Out	0.21	0.31	0.33	0.32	0.35	0.40	0.37	0.33	0.06
Highest 8h Outdoor	5.5E+3	6.1E+3	6.2E+3	7.0E+3	5.9E+3	3.3E+3	1.8E+3	5.1E+3	1.7E+3
Highest 8h Indoor	1.5E+3	1.8E+3	1.6E+3	2.0E+3	1.7E+3	1.5E+3	5.2E+2	1.5E+3	4.4E+2
Highest 8 h In/Out	0.27	0.30	0.26	0.29	0.29	0.46	0.28	0.31	0.06
Highest 1h Outdoor	6.4E+3	8.9E+3	1.1E+4	8.4E+3	8.5E+3	5.2E+3	1.6E+3	7.2E+3	2.9E+3
Highest 1h Indoor ²	1.5E+3	1.8E+3	1.6E+3	2.0E+3	1.7E+3	1.5E+3	5.2E+2	1.4E+3	5.5E+2
Highest 1h In/Out	0.26	0.15	0.18	0.25	0.19	0.12	0.40	0.22	0.09
Time of highest 1h Outdoor	2/21/14 1:10	2/21/14 19:17	2/22/14 21:45	2/23/14 22:12	2/24/14 21:58	2/26/14 10:17	2/26/14 12:00		
Corresponding highest 1h Indoor	2/21/14 4:40	2/21/14 23:17	2/23/14 0:26	2/24/14 2:12	2/25/14 1:58	2/26/14 11:20	2/26/14 12:00		

¹ Based on 24h periods starting / ending at noon. Day 1 starts at 2/20/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-1-R-4. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor/outdoor ratios for particles with aerodynamic diameters 6–100 nm based on difference between concentrations measured using the TSI 3787 CPC and the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.1E+4	1.1E+4	9.2E+3	1.1E+4	8.9E+3	1.1E+4	7.0E+3	9.7E+3	1.3E+3
Outdoor 24 SD	5.7E+3	1.0E+4	6.7E+3	6.1E+3	5.7E+3	5.9E+3	4.0E+3	6.3E+3	1.7E+3
Indoor 24h mean	2.0E+3	2.0E+3	1.6E+3	1.8E+3	1.5E+3	1.1E+3	8.0E+2	1.6E+3	4.3E+2
Indoor 24 SD	4.7E+2	7.5E+2	6.6E+2	6.4E+2	6.2E+2	2.5E+2	2.2E+2	5.2E+2	1.9E+2
24h mean In/Out	0.15	0.19	0.19	0.17	0.18	0.15	0.11	0.16	0.03
Highest 8h Outdoor	2.3E+4	1.8E+4	1.5E+4	1.5E+4	1.4E+4	1.3E+4	1.4E+4	1.6E+4	3.2E+3
Highest 8h Indoor	2.4E+3	2.8E+3	2.4E+3	2.5E+3	2.2E+3	1.3E+3	1.3E+3	2.1E+3	5.6E+2
Highest 8 h In/Out	0.10	0.15	0.16	0.17	0.16	0.09	0.09	0.13	0.03
Highest 1h Outdoor	2.4E+4	3.7E+4	2.3E+4	2.2E+4	1.8E+4	2.4E+4	1.5E+4	2.3E+4	6.4E+3
Highest 1h Indoor ²	2.4E+3	2.8E+3	2.4E+3	2.5E+3	2.2E+3	1.3E+3	1.3E+3	2.2E+3	6.9E+2
Highest 1h In/Out	0.11	0.08	0.13	0.10	0.12	0.07	0.06	0.10	0.02
Time of highest 1h Outdoor	2/20/14 20:24	2/21/14 19:16	2/22/14 21:05	2/24/14 7:52	2/25/14 3:47	2/26/14 9:38	2/27/14 5:05		
Corresponding highest 1h Indoor	2/20/14 21:45	2/21/14 23:16	2/23/14 0:05	2/24/14 8:23	2/25/14 4:46	2/26/14 10:51	2/27/14 6:03		

¹Based on 24h periods starting / ending at noon. Day 1 starts at 2/20/2014 19:00, and has <24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-1-R-5. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor/outdoor ratios for particles with aerodynamic diameters 100–300 nm based on difference between concentrations measured using the TSI 3781 CPC with size selector and the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	4.4E+6	3.9E+6	3.3E+6	4.3E+6	3.5E+6	1.6E+6	8.9E+5	3.1E+6	1.3E+6
Outdoor 24 SD	1.5E+6	3.2E+6	2.9E+6	2.4E+6	2.1E+6	1.7E+6	2.3E+5	2.0E+6	9.1E+5
Indoor 24h mean	1.2E+6	1.2E+6	1.1E+6	1.4E+6	1.2E+6	5.7E+5	3.5E+5	1.0E+6	3.5E+5
Indoor 24 SD	3.1E+5	4.7E+5	4.0E+5	5.2E+5	3.9E+5	1.5E+5	7.9E+4	3.3E+5	1.5E+5
24h mean In/Out	0.20	0.30	0.32	0.30	0.34	0.38	0.34	0.31	0.05
Highest 8h Outdoor	5.5E+6	6.0E+6	6.2E+6	7.0E+6	5.9E+6	3.2E+6	1.8E+6	5.1E+6	1.7E+6
Highest 8h Indoor	1.4E+6	1.7E+6	1.5E+6	1.9E+6	1.6E+6	1.4E+6	4.7E+5	1.5E+6	4.3E+5
Highest 8 h In/Out	0.26	0.29	0.25	0.28	0.27	0.45	0.26	0.29	0.06
Highest 1h Outdoor	6.4E+6	8.9E+6	1.1E+7	8.4E+6	8.5E+6	5.2E+6	1.5E+6	7.1E+6	2.9E+6
Highest 1h Indoor ²	1.4E+6	1.7E+6	1.5E+6	1.9E+6	1.6E+6	1.4E+6	4.7E+5	1.3E+6	5.5E+5
Highest 1h In/Out	0.25	0.14	0.17	0.24	0.19	0.11	0.36	0.21	0.08
Time of highest 1h Outdoor	2/21/14 1:10	2/21/14 19:17	2/22/14 21:45	2/23/14 22:12	2/24/14 21:58	2/26/14 10:17	2/26/14 12:00		
Corresponding highest 1h Indoor	2/21/14 4:41	2/21/14 23:17	2/23/14 0:34	2/24/14 2:12	2/25/14 1:58	2/26/14 12:00	2/26/14 12:00		

¹Based on 24h periods starting / ending at noon. Day 1 starts at 2/20/2014 19:00, and has <24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-1-R-6. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.3–0.4 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	4.7E+4	4.1E+4	3.3E+4	5.0E+4	4.5E+4	4.1E+4	2.3E+4	4.0E+4	8.5E+3
Outdoor 24 SD	1.3E+4	2.5E+4	2.3E+4	2.5E+4	2.1E+4	1.3E+4	1.0E+4	1.9E+4	6.0E+3
Indoor 24h mean	1.9E+4	1.9E+4	1.7E+4	2.3E+4	2.1E+4	1.6E+4	9.7E+3	1.8E+4	4.0E+3
Indoor 24 SD	5.1E+3	8.0E+3	5.2E+3	8.5E+3	6.0E+3	1.8E+3	2.6E+3	5.3E+3	2.3E+3
24h mean In/Out	0.31	0.45	0.49	0.45	0.49	0.44	0.38	0.43	0.06
Highest 8h Outdoor	5.7E+4	6.6E+4	5.6E+4	7.5E+4	6.5E+4	5.5E+4	4.6E+4	6.0E+4	8.8E+3
Highest 8h Indoor	2.4E+4	2.8E+4	2.3E+4	3.2E+4	2.8E+4	2.7E+4	1.4E+4	2.5E+4	5.2E+3
Highest 8 h In/Out	0.41	0.42	0.41	0.42	0.43	0.49	0.31	0.41	0.05
Highest 1h Outdoor	6.5E+4	7.5E+4	8.7E+4	8.5E+4	8.0E+4	6.3E+4	5.3E+4	7.2E+4	1.2E+4
Highest 1h Indoor ²	2.4E+4	2.8E+4	2.3E+4	3.2E+4	2.8E+4	2.7E+4	1.4E+4	2.4E+4	5.5E+3
Highest 1h In/Out	0.38	0.40	0.31	0.35	0.30	0.25	0.29	0.33	0.05
Time of highest 1h Outdoor	2/21/14 1:23	2/22/14 3:21	2/22/14 21:06	2/23/14 19:34	2/24/14 21:57	2/26/14 10:03	2/26/14 12:00		
Corresponding highest 1h Indoor	2/21/14 5:23	2/22/14 5:23	2/23/14 0:29	2/23/14 23:34	2/25/14 1:57	2/26/14 10:42	2/26/14 12:00		

¹Based on 24h periods starting / ending at noon. Day 1 starts at 2/20/2014 19:00, and has <24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-1-R-7. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.4–0.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	8.8E+3	8.2E+3	6.6E+3	9.4E+3	8.3E+3	6.6E+3	3.6E+3	7.4E+3	1.8E+3
Outdoor 24 SD	2.6E+3	5.5E+3	5.4E+3	5.6E+3	4.5E+3	3.8E+3	1.3E+3	4.1E+3	1.5E+3
Indoor 24h mean	3.5E+3	3.5E+3	3.0E+3	4.0E+3	3.6E+3	2.4E+3	1.5E+3	3.1E+3	8.1E+2
Indoor 24 SD	7.1E+2	1.4E+3	9.9E+2	1.5E+3	1.0E+3	3.5E+2	3.3E+2	9.0E+2	4.2E+2
24h mean In/Out	0.31	0.42	0.45	0.42	0.46	0.41	0.37	0.41	0.05
Highest 8h Outdoor	1.5E+4	1.4E+4	1.2E+4	1.5E+4	1.2E+4	1.0E+4	7.2E+3	1.2E+4	2.7E+3
Highest 8h Indoor	2.5E+3	5.0E+3	4.2E+3	5.6E+3	4.8E+3	4.6E+3	2.1E+3	4.1E+3	1.2E+3
Highest 8 h In/Out	0.17	0.35	0.36	0.37	0.39	0.46	0.29	0.34	0.08
Highest 1h Outdoor	1.5E+4	1.7E+4	2.1E+4	1.9E+4	1.6E+4	1.9E+4	8.0E+3	1.6E+4	4.0E+3
Highest 1h Indoor ²	2.5E+3	5.0E+3	4.2E+3	5.6E+3	4.8E+3	4.6E+3	2.1E+3	4.0E+3	1.2E+3
Highest 1h In/Out	0.20	0.30	0.24	0.31	0.27	0.16	0.29	0.25	0.05
Time of highest 1h Outdoor	2/20/14 19:16	2/21/14 22:52	2/22/14 21:08	2/23/14 22:15	2/24/14 21:57	2/25/14 15:12	2/26/14 12:00		
Corresponding highest 1h Indoor	2/20/14 23:16	2/22/14 2:52	2/23/14 0:22	2/24/14 2:02	2/25/14 1:57	2/25/14 15:12	2/26/14 12:00		

¹Based on 24h periods starting / ending at noon. Day 1 starts at 2/20/2014 19:00, and has <24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-1-R-8. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.5–0.7 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	5.1E+3	4.8E+3	3.9E+3	5.1E+3	4.6E+3	3.7E+3	2.2E+3	4.2E+3	9.5E+2
Outdoor 24 SD	1.7E+3	3.6E+3	3.4E+3	3.0E+3	2.7E+3	2.5E+3	5.0E+2	2.5E+3	1.0E+3
Indoor 24h mean	2.3E+3	2.1E+3	1.8E+3	2.2E+3	2.0E+3	1.4E+3	9.1E+2	1.8E+3	4.5E+2
Indoor 24 SD	2.9E+2	7.8E+2	5.7E+2	7.0E+2	5.6E+2	1.6E+2	1.6E+2	4.6E+2	2.4E+2
24h mean In/Out	0.40	0.45	0.45	0.42	0.47	0.41	0.40	0.43	0.02
Highest 8h Outdoor	1.1E+4	8.7E+3	7.0E+3	8.3E+3	7.1E+3	5.7E+3	3.8E+3	7.4E+3	2.1E+3
Highest 8h Indoor	2.5E+3	3.0E+3	2.4E+3	3.0E+3	2.6E+3	2.5E+3	1.3E+3	2.5E+3	5.4E+2
Highest 8 h In/Out	0.23	0.34	0.35	0.36	0.37	0.45	0.33	0.35	0.06
Highest 1h Outdoor	1.1E+4	1.3E+4	1.4E+4	1.1E+4	1.0E+4	1.2E+4	3.8E+3	1.1E+4	3.0E+3
Highest 1h Indoor ²	2.5E+3	3.0E+3	2.4E+3	3.0E+3	2.6E+3	2.5E+3	1.3E+3	2.5E+3	6.8E+2
Highest 1h In/Out	0.24	0.24	0.22	0.28	0.29	0.14	0.35	0.25	0.06
Time of highest 1h Outdoor	2/20/14 19:16	2/21/14 21:35	2/22/14 21:43	2/23/14 22:18	2/25/14 6:07	2/25/14 15:12	2/26/14 12:00		
Corresponding highest 1h Indoor	2/20/14 21:02	2/22/14 1:35	2/23/14 0:03	2/24/14 0:48	2/25/14 7:44	2/25/14 15:24	2/26/14 12:00		

¹Based on 24h periods starting / ending at noon. Day 1 starts at 2/20/2014 19:00, and has <24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-1-R-9. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.7–1.0 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.0E+3	9.3E+2	8.6E+2	9.7E+2	9.2E+2	1.0E+3	7.0E+2	9.2E+2	1.0E+2
Outdoor 24 SD	3.8E+2	7.4E+2	7.0E+2	5.1E+2	6.0E+2	4.3E+2	2.0E+2	5.1E+2	1.8E+2
Indoor 24h mean	5.9E+2	4.4E+2	3.5E+2	4.1E+2	4.0E+2	3.4E+2	2.5E+2	4.0E+2	9.9E+1
Indoor 24 SD	2.7E+2	1.7E+2	1.0E+2	1.1E+2	1.0E+2	2.8E+1	4.2E+1	1.2E+2	7.6E+1
24h mean In/Out	0.68	0.53	0.45	0.39	0.46	0.39	0.34	0.46	0.11
Highest 8h Outdoor	2.0E+3	1.8E+3	1.4E+3	1.5E+3	1.5E+3	1.2E+3	1.1E+3	1.5E+3	2.8E+2
Highest 8h Indoor	1.5E+3	6.4E+2	4.8E+2	5.4E+2	5.0E+2	4.8E+2	3.3E+2	6.4E+2	3.6E+2
Highest 8 h In/Out	0.75	0.36	0.34	0.35	0.34	0.39	0.29	0.40	0.14
Highest 1h Outdoor	2.0E+3	2.7E+3	2.8E+3	2.2E+3	2.5E+3	1.8E+3	1.1E+3	2.2E+3	5.5E+2
Highest 1h Indoor ²	1.5E+3	6.4E+2	4.8E+2	5.4E+2	5.0E+2	4.8E+2	3.3E+2	6.6E+2	3.7E+2
Highest 1h In/Out	0.75	0.25	0.21	0.27	0.23	0.19	0.30	0.31	0.18
Time of highest 1h Outdoor	2/20/14 19:17	2/21/14 21:35	2/22/14 21:45	2/23/14 22:20	2/25/14 6:09	2/25/14 15:12	2/26/14 12:00		
Corresponding highest 1h Indoor	2/20/14 19:17	2/21/14 23:48	2/22/14 23:28	2/24/14 0:08	2/25/14 8:02	2/25/14 16:02	2/26/14 12:00		

¹Based on 24h periods starting / ending at noon. Day 1 starts at 2/20/2014 19:00, and has <24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-1-R-10. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 1.0–2.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	5.9E+2	5.5E+2	4.8E+2	5.1E+2	5.4E+2	6.2E+2	4.1E+2	5.3E+2	6.3E+1
Outdoor 24 SD	2.1E+2	4.4E+2	3.8E+2	2.3E+2	3.5E+2	2.0E+2	1.6E+2	2.8E+2	9.8E+1
Indoor 24h mean	6.3E+2	3.1E+2	1.6E+2	1.8E+2	1.8E+2	1.7E+2	1.4E+2	2.5E+2	1.6E+2
Indoor 24 SD	7.5E+2	2.6E+2	4.5E+1	4.2E+1	4.9E+1	2.3E+1	2.1E+1	1.7E+2	2.5E+2
24h mean In/Out	1.82	0.74	0.44	0.31	0.36	0.31	0.28	0.61	0.52
Highest 8h Outdoor	8.5E+2	1.0E+3	7.4E+2	7.6E+2	8.3E+2	7.3E+2	7.3E+2	8.1E+2	9.9E+1
Highest 8h Indoor	3.6E+3	4.9E+2	2.1E+2	2.3E+2	2.3E+2	2.2E+2	1.7E+2	7.3E+2	1.2E+3
Highest 8 h In/Out	4.24	0.48	0.29	0.30	0.27	0.30	0.24	0.87	1.38
Highest 1h Outdoor	9.0E+2	1.7E+3	1.4E+3	1.1E+3	1.5E+3	9.7E+2	7.9E+2	1.2E+3	3.2E+2
Highest 1h Indoor ²	3.6E+3	4.9E+2	2.1E+2	2.3E+2	2.3E+2	2.2E+2	1.7E+2	3.2E+2	1.9E+2
Highest 1h In/Out	0.37	0.45	0.19	0.24	0.17	0.18	0.22	0.26	0.10
Time of highest 1h Outdoor	2/21/14 3:01	2/21/14 21:35	2/22/14 22:09	2/23/14 22:20	2/25/14 6:29	2/26/14 10:34	2/26/14 12:00		
Corresponding highest 1h Indoor	2/21/14 3:01	2/21/14 21:35	2/22/14 23:28	2/24/14 0:03	2/25/14 7:56	2/26/14 11:48	2/26/14 12:03		

¹Based on 24h periods starting / ending at noon. Day 1 starts at 2/20/2014 19:00, and has <24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-1-R-11. Summary statistics for estimated PM_{2.5} concentrations (µg m⁻³) calculated from particle number concentrations resolved by size from 6 nm to 2.5 microns (as reported in Tables FW-1-R-2 to FW-1-R-9) and resulting indoor/outdoor ratios.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	2.7E+1	2.4E+1	2.1E+1	2.6E+1	2.3E+1	1.6E+1	9.3E+0	2.1E+1	5.9E+0
Outdoor 24 SD	8.5E+0	1.7E+1	1.6E+1	1.4E+1	1.2E+1	8.4E+0	2.2E+0	1.1E+1	4.8E+0
Indoor 24h mean	1.1E+1	8.8E+0	7.1E+0	9.0E+0	7.9E+0	5.0E+0	3.3E+0	7.4E+0	2.4E+0
Indoor 24 SD	3.3E+0	3.1E+0	2.4E+0	3.1E+0	2.4E+0	7.0E-1	5.9E-1	2.2E+0	1.0E+0
24h mean In/Out	0.44	0.38	0.36	0.32	0.36	0.36	0.31	0.36	0.04
Highest 8h Outdoor	3.6E+1	3.9E+1	3.7E+1	4.1E+1	3.5E+1	2.4E+1	1.8E+1	3.3E+1	8.0E+0
Highest 8h Indoor	2.1E+1	1.2E+1	9.9E+0	1.2E+1	1.0E+1	9.7E+0	4.4E+0	1.1E+1	4.5E+0
Highest 8 h In/Out	0.58	0.30	0.27	0.30	0.30	0.41	0.24	0.34	0.11
Highest 1h Outdoor	3.8E+1	4.6E+1	6.4E+1	5.1E+1	4.7E+1	3.6E+1	1.8E+1	4.3E+1	1.3E+1
Highest 1h Indoor ²	2.1E+1	1.2E+1	9.9E+0	1.2E+1	1.0E+1	9.7E+0	4.4E+0	9.6E+0	3.0E+0
Highest 1h In/Out	0.28	0.25	0.19	0.25	0.21	0.14	0.28	0.23	0.05
Time of highest 1h Outdoor	2/21/14 1:17	2/21/14 22:48	2/22/14 21:45	2/23/14 22:13	2/24/14 21:58	2/26/14 10:17	2/26/14 12:00		
Corresponding highest 1h Indoor	2/21/14 3:47	2/22/14 2:48	2/23/14 0:20	2/24/14 1:40	2/25/14 1:58	2/26/14 11:02	2/26/14 12:00		

¹Based on 24h periods starting / ending at noon. Day 1 starts at 2/20/2014 19:00, and has <24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-1-R-12. Summary statistics for concentrations of PM_{2.5} ($\mu\text{g m}^{-3}$) and indoor /outdoor ratios from measurements reported by TSI DustTrak II.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.5E-2	3.6E-2	2.0E-2	3.2E-2	2.8E-2	2.0E-2	9.7E-3	2.3E-2	8.8E-3
Outdoor 24 SD	1.3E-2	4.3E-2	1.9E-2	2.0E-2	1.7E-2	1.2E-2	4.3E-3	1.8E-2	1.1E-2
Indoor 24h mean	9.0E-3	1.6E-2	1.0E-2	1.4E-2	1.2E-2	8.2E-3	4.2E-3	1.1E-2	3.6E-3
Indoor 24 SD	6.6E-3	2.8E-2	1.1E-2	9.3E-3	7.5E-3	4.4E-3	2.2E-3	9.8E-3	7.9E-3
24h mean In/Out	0.54	0.61	0.42	0.44	0.46	0.43	0.40	0.47	0.07
Highest 8h Outdoor	3.9E-2	6.7E-2	3.6E-2	5.0E-2	4.2E-2	3.4E-2	2.2E-2	4.1E-2	1.3E-2
Highest 8h Indoor	1.9E-2	2.5E-2	1.7E-2	2.0E-2	1.6E-2	1.5E-2	7.2E-3	1.7E-2	5.0E-3
Highest 8 h In/Out	0.50	0.37	0.48	0.39	0.39	0.45	0.33	0.42	0.06
Highest 1h Outdoor	3.9E-2	8.8E-2	6.7E-2	6.1E-2	5.7E-2	3.8E-2	2.2E-2	5.3E-2	2.0E-2
Highest 1h Indoor ²	1.9E-2	2.5E-2	1.7E-2	2.0E-2	1.6E-2	1.5E-2	7.2E-3	2.4E-2	1.8E-2
Highest 1h In/Out	0.50	0.72	0.53	0.34	0.26	0.25	0.34	0.42	0.16
Time of highest 1h Outdoor	2/20/14 19:49	2/21/14 21:19	2/22/14 21:08	2/23/14 22:13	2/24/14 21:58	2/26/14 10:06	2/26/14 12:00		
Corresponding highest 1h Indoor	2/20/14 19:51	2/21/14 21:31	2/22/14 21:19	2/24/14 0:09	2/25/14 0:02	2/26/14 10:39	2/26/14 12:00		

¹Based on 24h periods starting / ending at noon. Day 1 starts at 2/20/2014 19:00, and has <24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-1-R-13. Daily¹ summary statistics for concentrations (nanograms m^{-3}) and indoor /outdoor ratios of aerosol black carbon measured using the Aethalometer AE22.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.9E+3	1.4E+3	8.6E+2	1.4E+3	1.5E+3	6.1E+2	3.2E+2	1.1E+3	5.1E+2
Outdoor 24 SD	9.4E+2	1.1E+3	8.9E+2	1.0E+3	1.1E+3	3.7E+2	1.3E+2	7.9E+2	3.5E+2
Indoor 24h mean	1.0E+3	8.4E+2	5.9E+2	6.3E+2	7.0E+2	3.1E+2	1.5E+2	6.1E+2	2.8E+2
Indoor 24 SD	5.4E+2	4.8E+2	3.6E+2	3.7E+2	3.4E+2	1.3E+2	1.1E+2	3.3E+2	1.5E+2
24h mean In/Out	0.55	0.61	0.64	0.50	0.48	0.57	0.43	0.54	0.07
Highest 8h Outdoor	2.6E+3	2.5E+3	1.7E+3	2.5E+3	2.6E+3	1.4E+3	8.9E+2	2.0E+3	6.4E+2
Highest 8h Indoor	1.2E+3	1.2E+3	7.9E+2	1.0E+3	1.0E+3	8.9E+2	3.0E+2	9.2E+2	2.9E+2
Highest 8 h In/Out	0.48	0.47	0.46	0.41	0.40	0.63	0.33	0.45	0.09
Highest 1h Outdoor	3.2E+3	3.1E+3	3.1E+3	3.4E+3	3.3E+3	1.5E+3	9.4E+2	2.6E+3	9.1E+2
Highest 1h Indoor ²	1.2E+3	1.2E+3	7.9E+2	1.0E+3	1.0E+3	8.9E+2	3.0E+2	9.8E+2	4.1E+2
Highest 1h In/Out	0.44	0.48	0.35	0.32	0.33	0.24	0.39	0.36	0.07
Time of highest 1h Outdoor	2/20/14 23:40	2/22/14 3:06	2/22/14 22:20	2/23/14 22:16	2/24/14 22:07	2/26/14 9:55	2/26/14 12:00		
Corresponding highest 1h Indoor	2/21/14 2:47	2/22/14 5:39	2/23/14 0:01	2/24/14 1:34	2/25/14 2:01	2/26/14 12:02	2/26/14 12:02		

¹Based on 24h periods starting / ending at noon. Day 1 starts at 2/20/2014 19:00, and has <24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Appendix FW-2-C. Results for System C, February 27 – March 6, 2014.

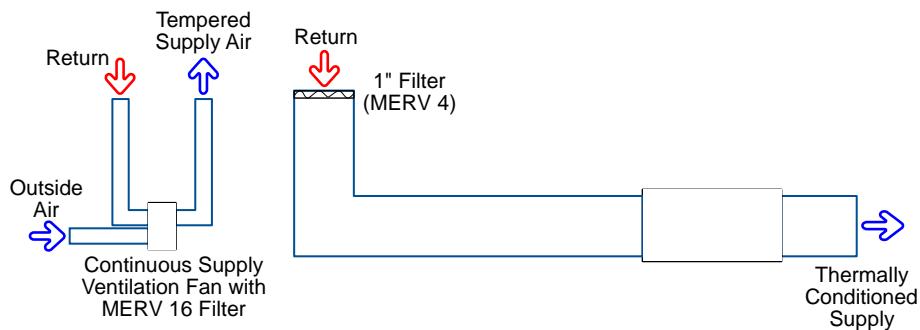


Table FW-2-C-1. Description of **System C** component characteristics during the period of **February 27 – March 6, 2014**

System Parameter	Description or Measured Value
Heating	75,000 BTU/h, 80% eff., gas furnace, 1-stage burner
Cooling	3 ton, SEER13 air conditioner
Thermal distribution	Central fan with PSC motor: 1200 cfm for cooling, 1074 cfm for heating
Ventilation	Blended supply fan providing tempered outside air (38 cfm) by blending with inside air (58 cfm), continuous operation.
Filtration	MERV4, 1" (Purolator F312) filter installed at return air ceiling grill of forced air furnace. MERV16 on the blended system.
Recirculation blower schedule	As required for thermal conditioning, no fan cycler.
VOC removal system	LBNL / IQAir treated filter on the blended system

Notes about this monitoring period

We lost communication with the B&K instrument early in the operational period, and as a result only have ventilation rate measurements for the first ~28 h. The DustTrak instruments were running for long periods at or below their detection limits. The aethalometers had detection limit issues for the indoor values. All of the other instruments were functioning normally.

The 24 h running statistics in the figures starts at 2/28/2014 18:00.

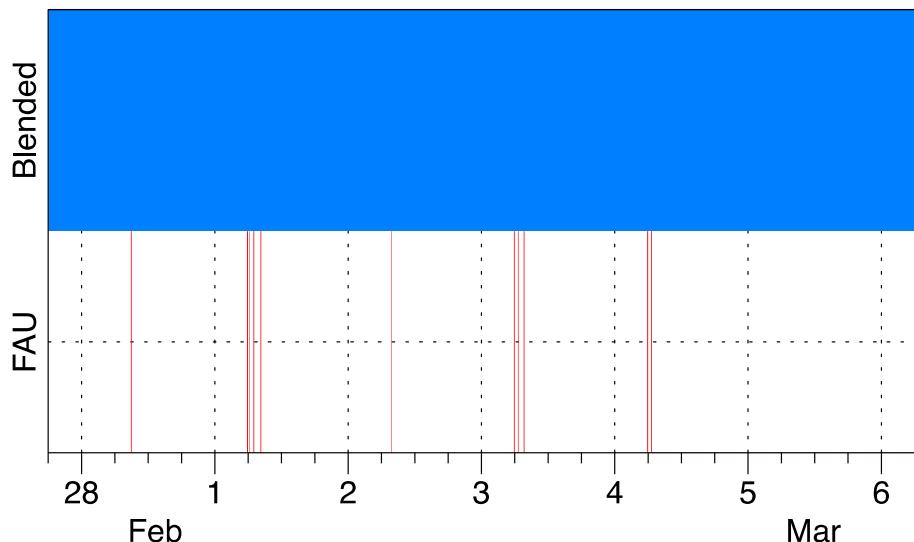


Figure FW-2-C-1. Operation of mechanical systems: Blended system fan; fan on central forced air unit (FAU).

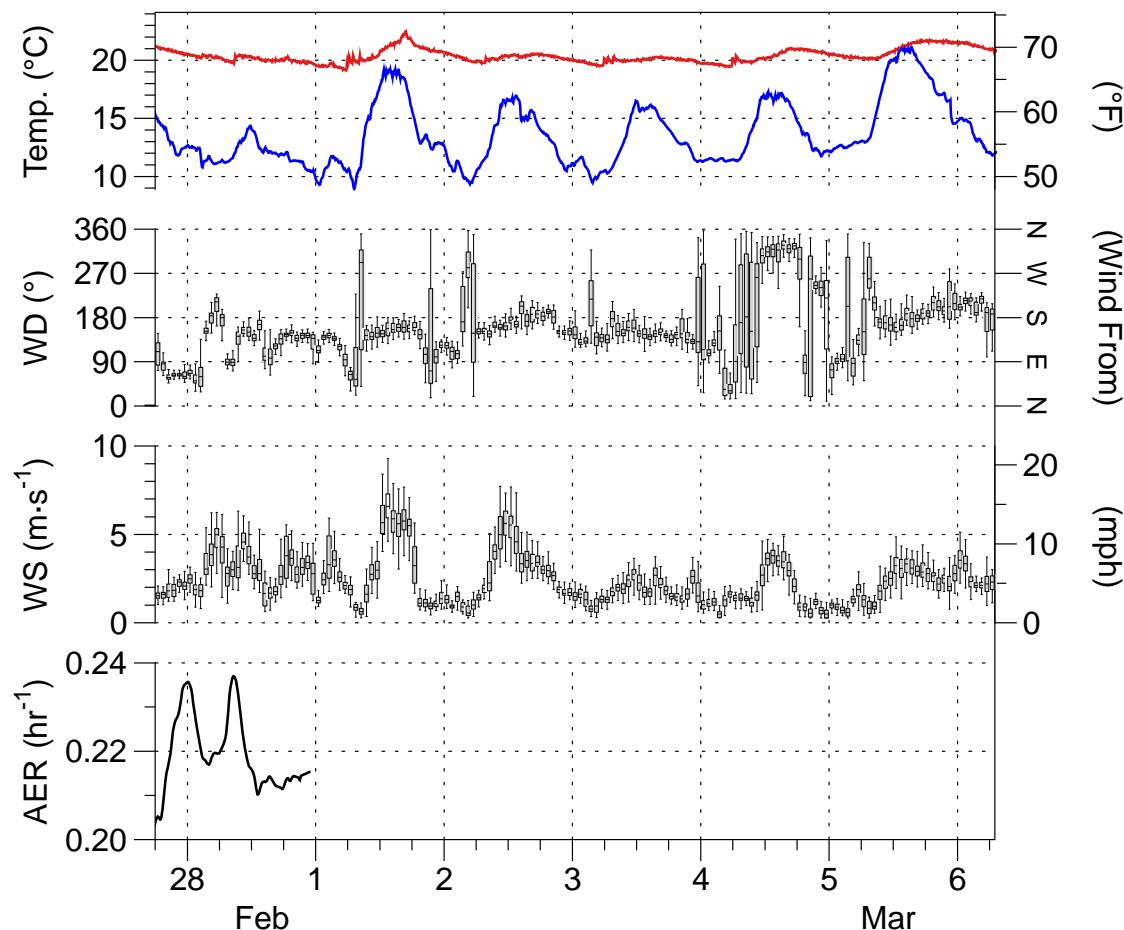


Figure FW-2-C-2. Environmental parameters measured during operation of System C, Feb 27 – Mar 6, 2014. From top to bottom: indoor (red) and outdoor (blue) temperatures, wind direction (WD) in units of degrees from North, wind speed (WS), and air exchange rate (AER). For WD and WS, the box for each hour shows the 25th, 50th and 75th percentiles of the measured values and whiskers extend 1.5X the interquartile range (75th–25th percentile values) above the 75th and below the 25th percentile values.

Guide to plots of pollutant concentration time series and indoor / outdoor (I/O) ratios

The bottom section of each plot shows outdoor and indoor time series using the resolution of data collection: 3-min for black carbon and 1-min for all other parameters. The top and bottom of grey band are LOESS-smoothed, 1-min (or 3-min for black carbon) time-series. Also shown are time series with 1h and 24h time averaging for most pollutant. Triangles in bottom of plot indicate the highest 1h outdoor and corresponding highest 1h indoor average during each day. The top section of each plot shows the ratio of indoor to outdoor running 24h mean values (8h for ozone) and the ratios of highest 1h indoor to corresponding highest 1h outdoor concentration each day.

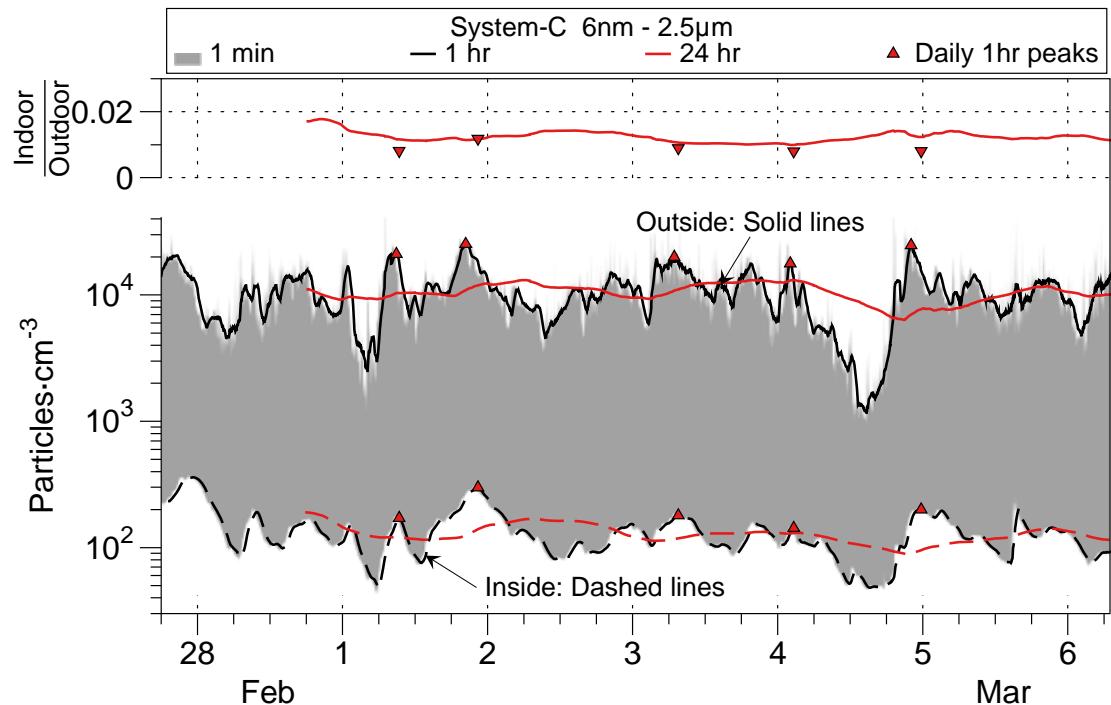


Figure FW-2-C-3. Number concentrations of 6 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of System C, Feb 27 – Mar 6, 2014. Data collected using TSI 3787 CPCs.

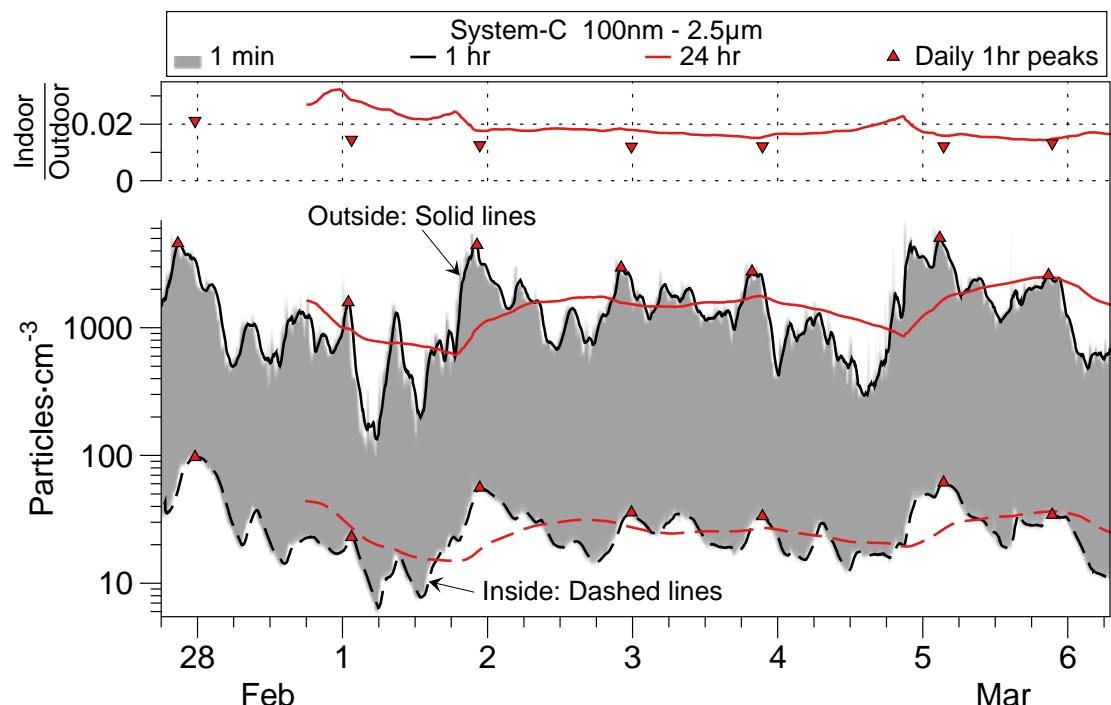


Figure FW-2-C-4. Number concentrations of 100 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of System C, Feb 27 – Mar 6, 2014. Data collected using TSI 3781 CPCs outfitted with screens to exclude particles smaller than 100 nm. Refer to “Guide” before Figure FW-2-C-3.

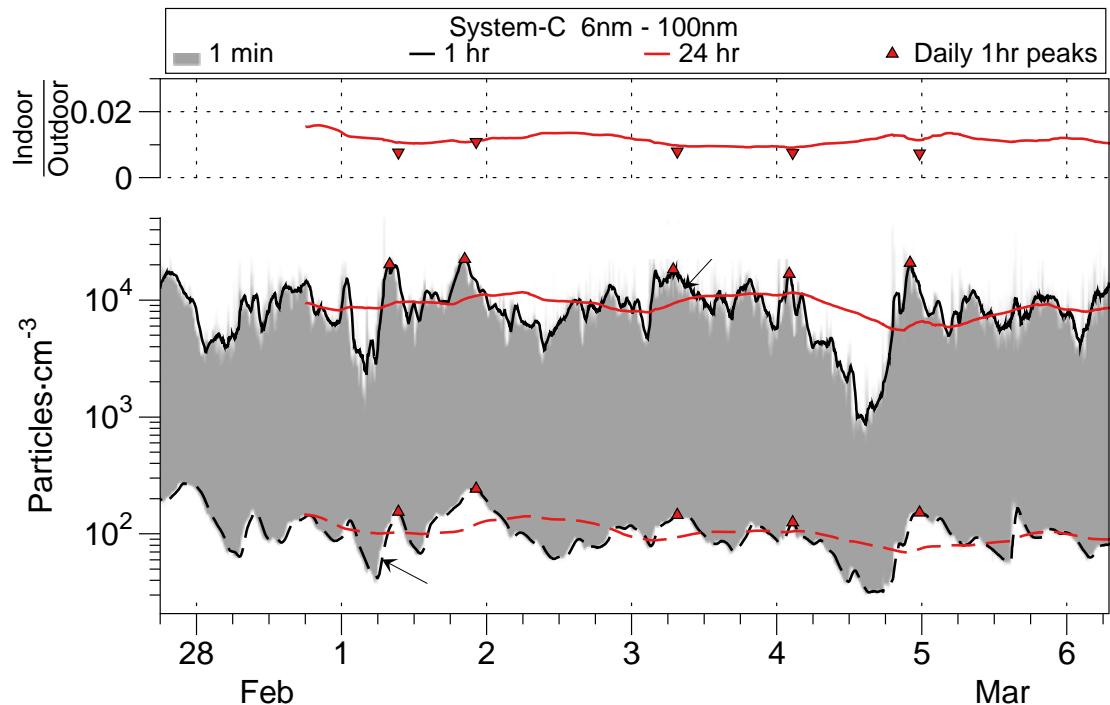


Figure FW-2-C-5. Number concentrations of 6–100 nm diameter particles measured outdoors and indoors during operation of System C, Feb 27 – Mar 6, 2014. Data obtained as the difference between time series shown in prior two figures. Refer to “Guide” before Figure FW-2-C-3.

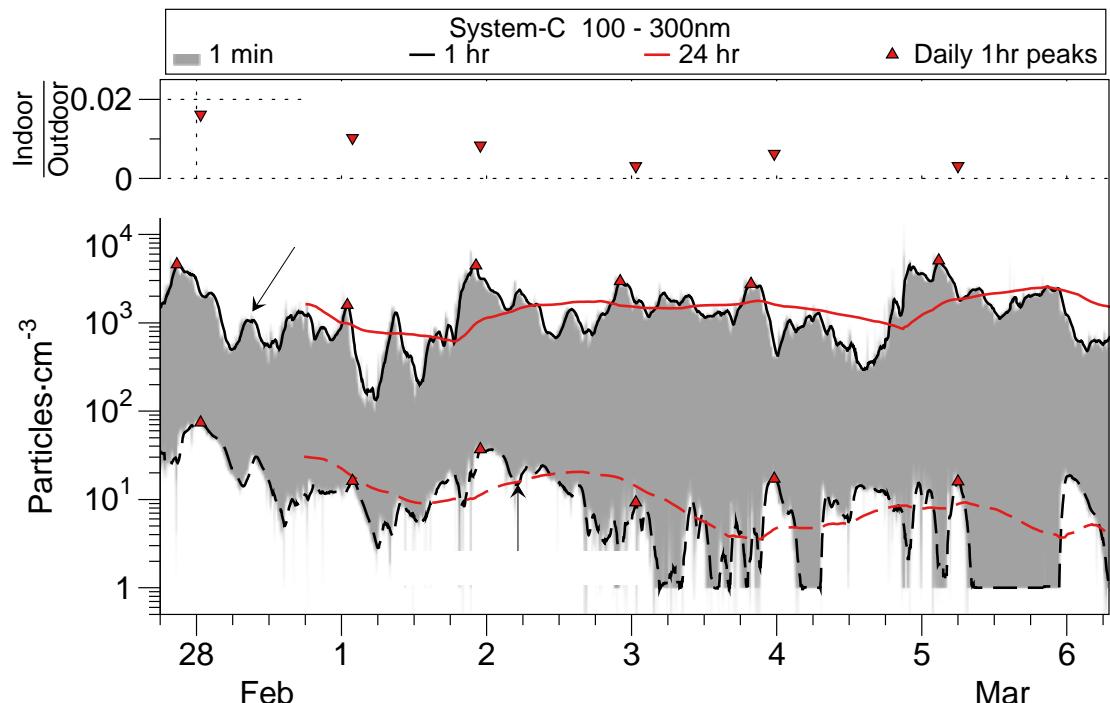


Figure FW-2-C-6. Number concentrations of 100–300 nm diameter particles measured outdoors and indoors during operation of System C, Feb 27 – Mar 6, 2014. Data obtained as the difference between the TSI 3781 CPC with size selector and the MetOne BT637S OPC. Refer to “Guide” before Figure FW-2-C-3.

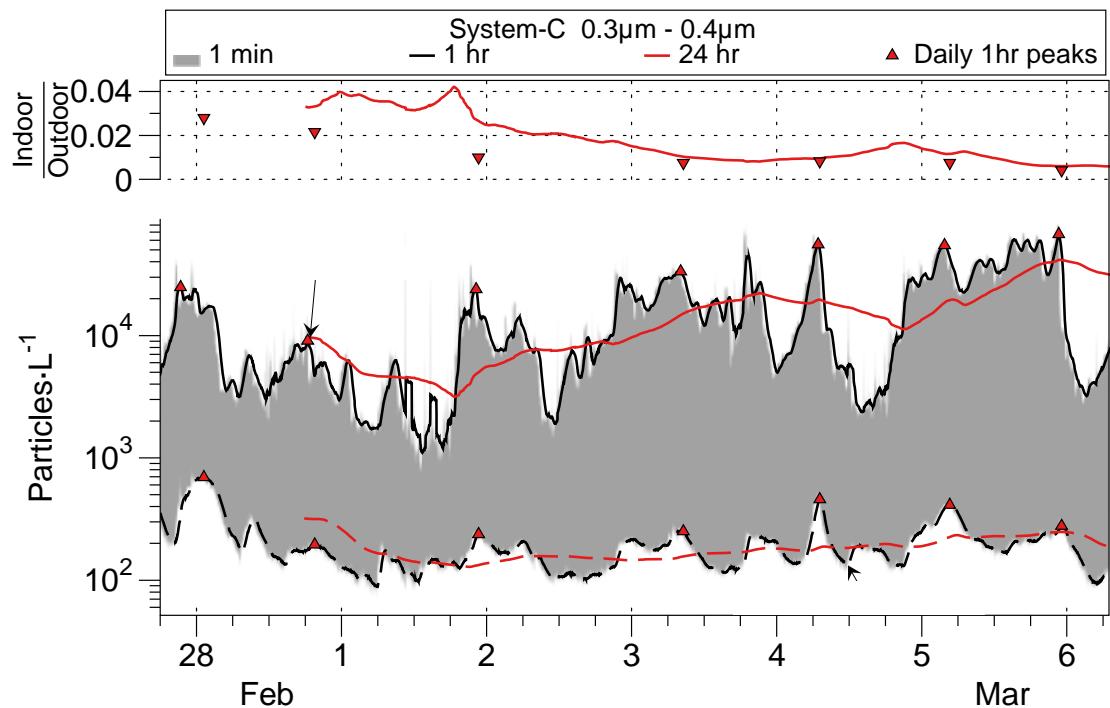


Figure FW-2-C-7. Number concentrations of 0.3–0.4 μm diameter particles measured outdoors and indoors during operation of System C, Feb 27 – Mar 6, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-2-C-3.

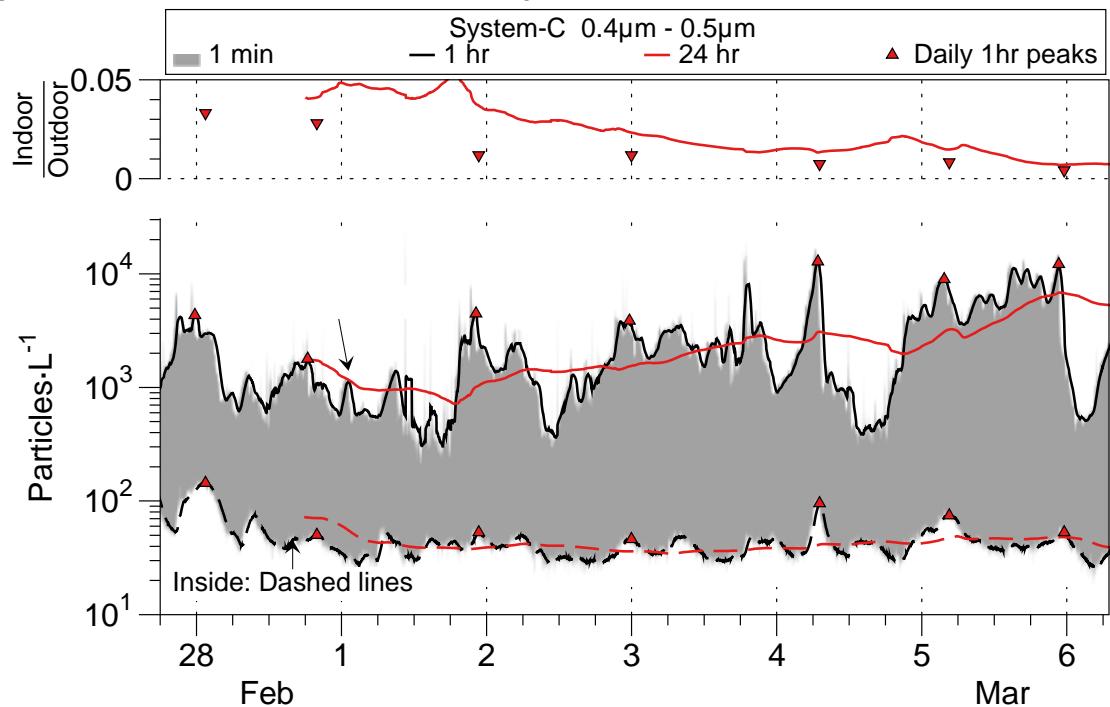


Figure FW-2-C-8. Number concentrations of 0.4–0.5 μm diameter particles measured outdoors and indoors during operation of System C, Feb 27 – Mar 6, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-2-C-3.

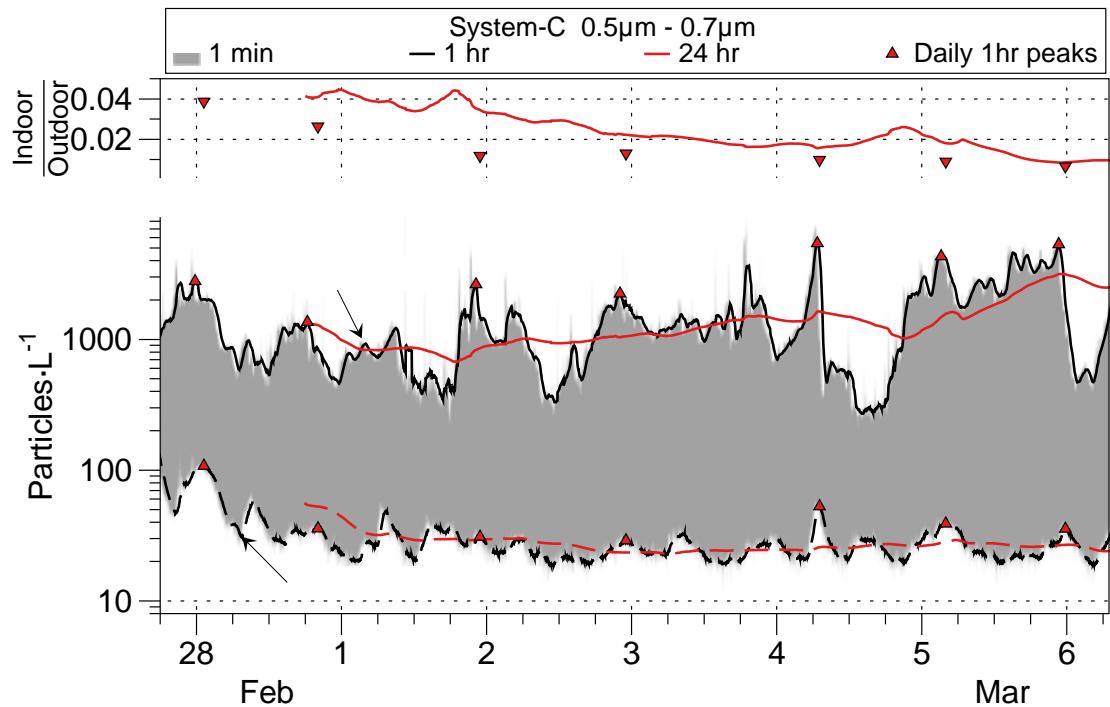


Figure FW-2-C-9. Number concentrations of 0.5–0.7 μm diameter particles measured outdoors and indoors during operation of System C, Feb 27 – Mar 6, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-2-C-3.

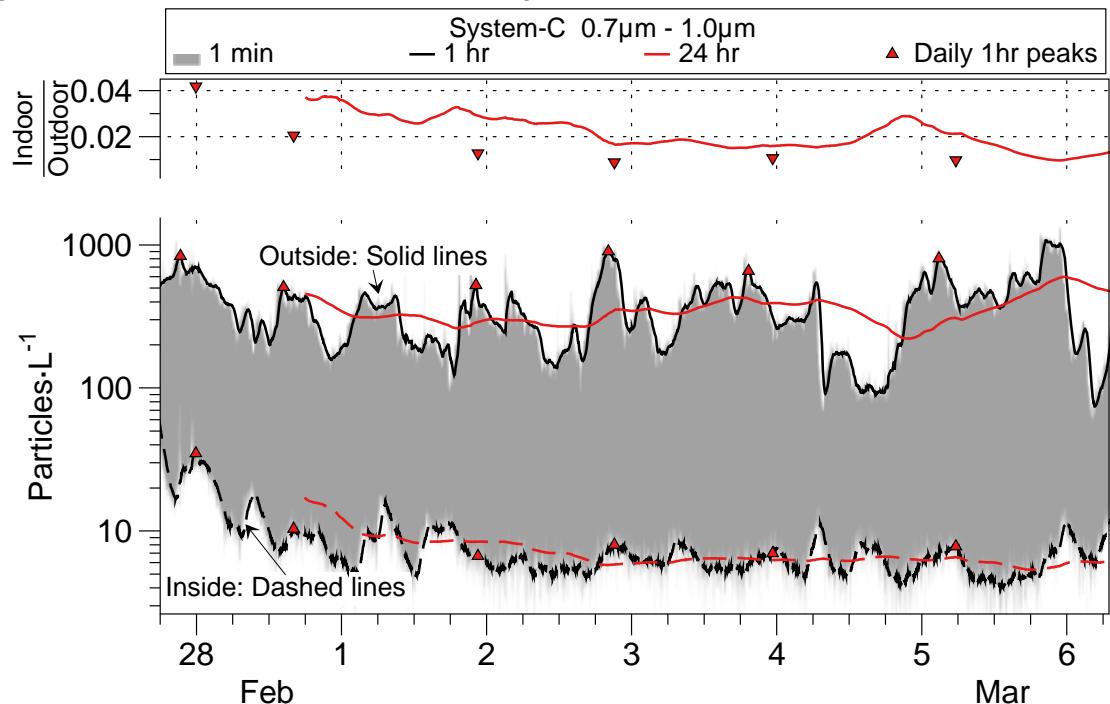


Figure FW-2-C-10. Number concentrations of 0.7–1.0 μm diameter particles measured outdoors and indoors during operation of System C, Feb 27 – Mar 6, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-2-C-3 for details.

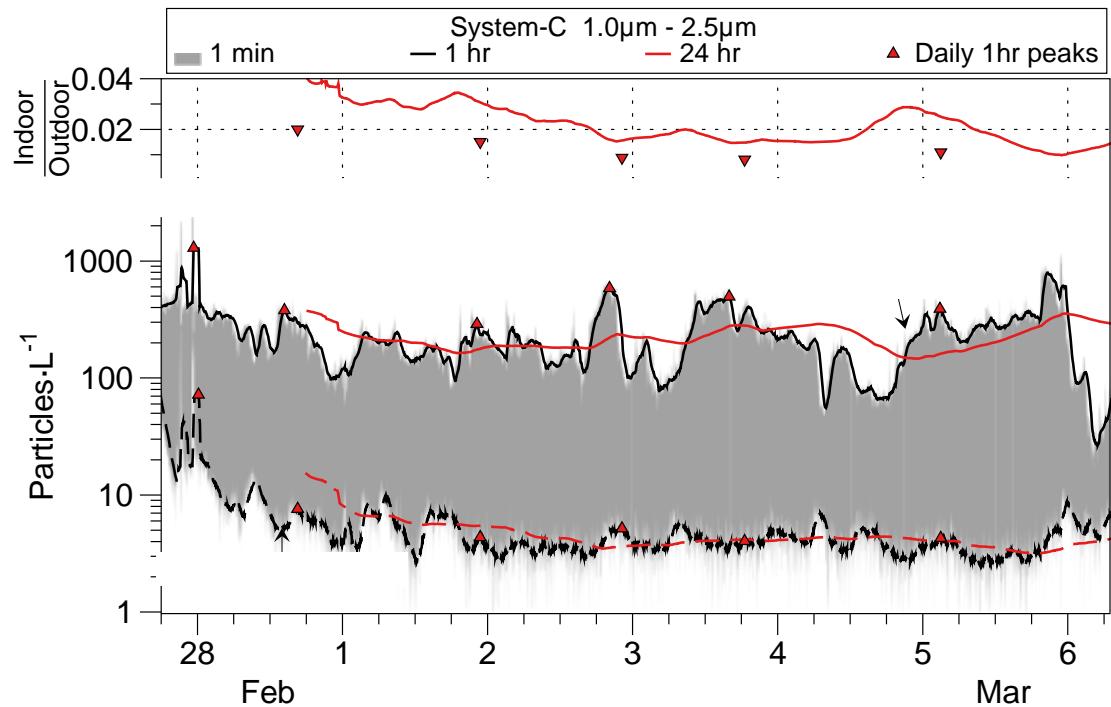


Figure FW-2-C-11. Number concentrations of 1.0–2.5 μm diameter particles measured outdoors and indoors during operation of System C, Feb 27 – Mar 6, 2014. Data collected using MetOne BT637S particle counters. Refer to Figure FW-2-C-3 for details.

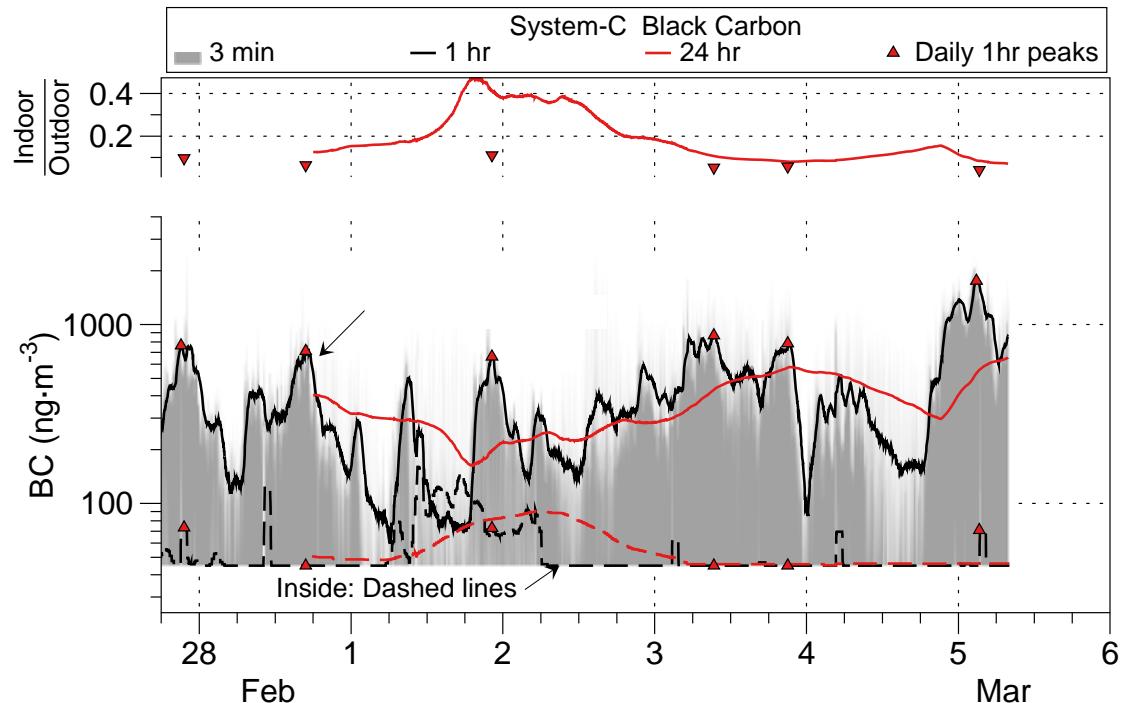


Figure FW-2-C-12. Black carbon concentrations measured outdoors and indoors during operation of System C, Feb 27 – Mar 6, 2014. Data collected using AE22 Aethalometers with 3-min samples. Data otherwise as described in Figure FW-2-C-3 caption.

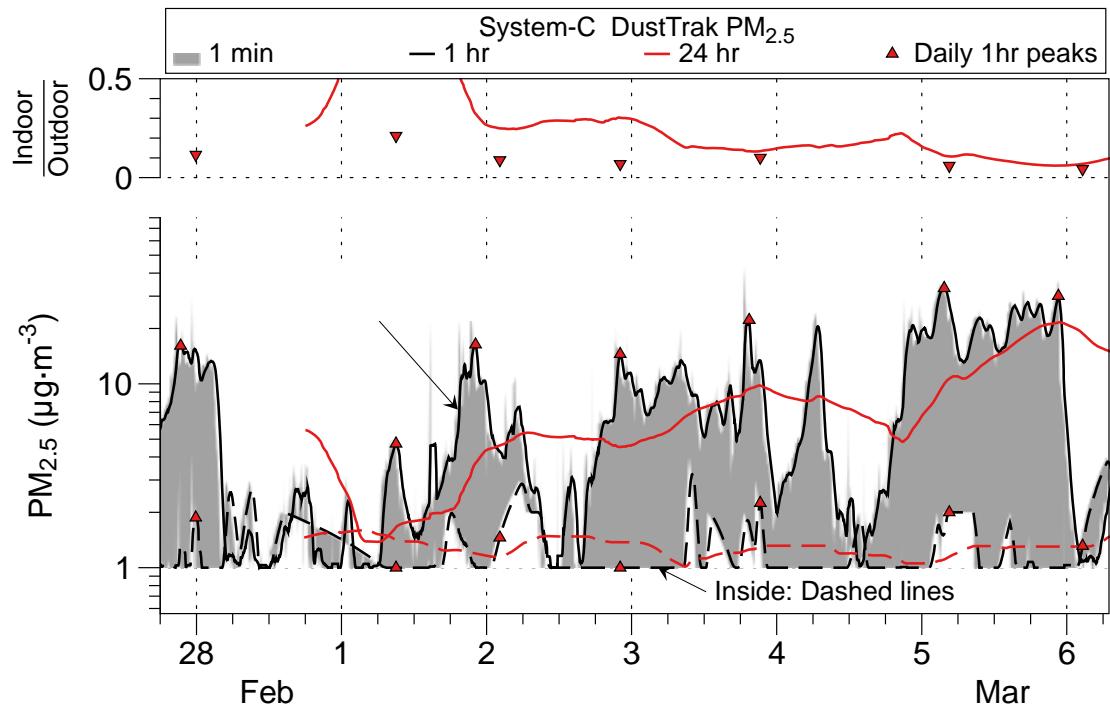


Figure FW-2-C-13. PM_{2.5} reported by TSI DustTrak II 8530 measurements outdoors and indoors during operation of System C, Feb 27 - Mar 6, 2014. The DustTrak measures light scattering and uses a calibration to estimate PM_{2.5} mass. Refer to “Guide” before Figure FW-2-C-3.

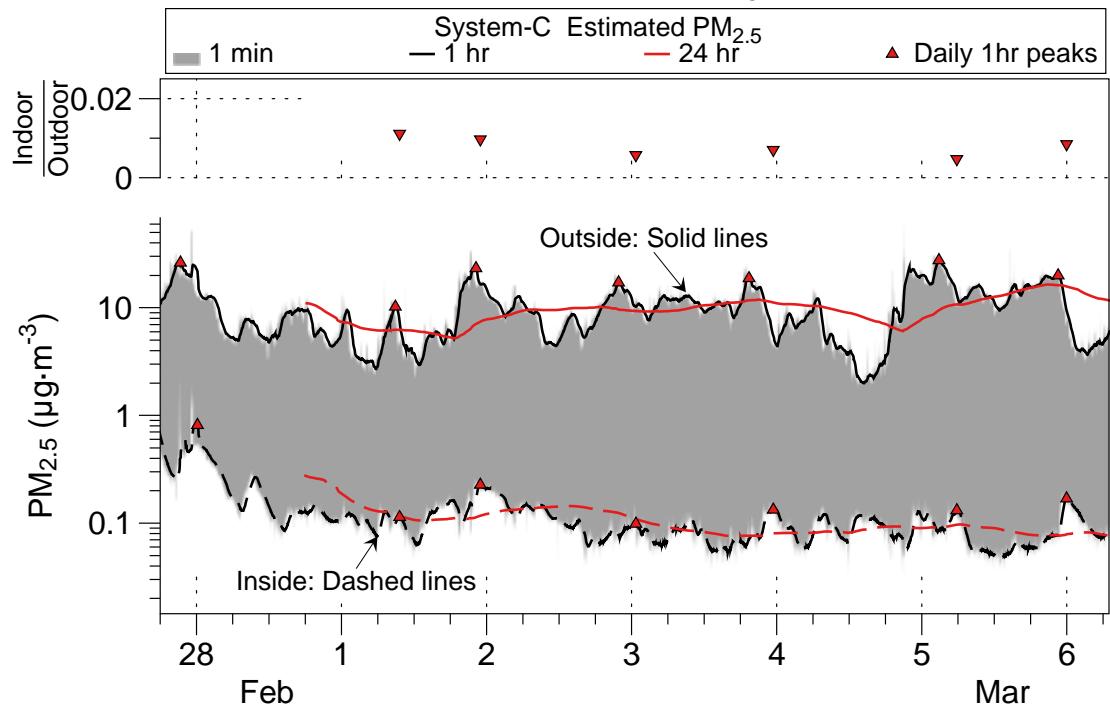


Figure FW-2-C-14. Estimated PM_{2.5} concentration calculated from size-resolved particle number concentrations measured by MetOne and CPC during operation of Reference System, Feb 27-Mar 6, 2014. Details provided in body of report. Refer to “Guide” before Figure FW-2-C-3.

Table FW-2-C-2. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor/outdoor ratios for particles with aerodynamic diameters 6 nm to 2.5 micron measured using the TSI 3787 CPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.2E+4	1.0E+4	1.2E+4	1.2E+4	1.0E+4	9.1E+3	1.0E+4	1.1E+4	1.1E+3
Outdoor 24 SD	5.9E+3	6.1E+3	5.2E+3	5.0E+3	4.7E+3	6.6E+3	4.0E+3	5.4E+3	8.3E+2
Indoor 24h mean	2.8E+2	1.2E+2	1.6E+2	1.2E+2	1.1E+2	1.1E+2	1.1E+2	1.5E+2	5.6E+1
Indoor 24 SD	1.8E+2	3.3E+1	6.2E+1	3.1E+1	2.0E+1	5.5E+1	3.0E+1	5.9E+1	5.1E+1
24h mean In/Out	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Highest 8h Outdoor	2.1E+4	1.3E+4	1.7E+4	1.6E+4	1.6E+4	1.5E+4	1.1E+4	1.6E+4	3.0E+3
Highest 8h Indoor	1.2E+3	1.4E+2	2.4E+2	1.6E+2	1.6E+2	1.8E+2	1.4E+2	3.2E+2	3.7E+2
Highest 8 h In/Out	0.06	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
Highest 1h Outdoor	2.1E+4	2.1E+4	2.5E+4	2.0E+4	1.8E+4	2.5E+4	1.5E+4	2.1E+4	3.4E+3
Highest 1h Indoor ²	1.2E+3	1.4E+2	2.4E+2	1.6E+2	1.6E+2	1.8E+2	1.4E+2	3.3E+2	3.7E+2
Highest 1h In/Out	0.06	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
Time of highest 1h Outdoor	2/27/14 13:15	3/1/14 8:55	3/1/14 20:22	3/3/14 6:52	3/4/14 2:04	3/4/14 22:04	3/6/14 7:32		
Corresponding highest 1h Indoor	2/27/14 13:15	3/1/14 9:21	3/1/14 22:24	3/3/14 7:33	3/4/14 2:38	3/4/14 23:43	3/6/14 8:50		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 2/28/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-2-C-3. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor/outdoor ratios for particles with aerodynamic diameters 100 nm to 2.5 micron measured using the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	2.4E+3	1.0E+3	2.2E+3	2.1E+3	1.7E+3	2.8E+3	1.9E+3	2.0E+3	5.2E+2
Outdoor 24 SD	1.5E+3	5.7E+2	1.5E+3	8.1E+2	8.1E+2	2.1E+3	9.6E+2	1.2E+3	4.9E+2
Indoor 24h mean	7.8E+1	2.3E+1	3.9E+1	3.4E+1	3.0E+1	4.3E+1	3.1E+1	4.0E+1	1.7E+1
Indoor 24 SD	4.0E+1	6.8E+0	1.9E+1	9.1E+0	7.2E+0	2.1E+1	1.1E+1	1.6E+1	1.1E+1
24h mean In/Out	0.05	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.01
Highest 8h Outdoor	4.0E+3	1.4E+3	3.7E+3	2.7E+3	2.5E+3	5.2E+3	3.9E+3	3.4E+3	1.2E+3
Highest 8h Indoor	1.1E+2	2.7E+1	6.1E+1	4.0E+1	3.5E+1	7.0E+1	6.0E+1	5.7E+1	2.5E+1
Highest 8 h In/Out	0.03	0.02	0.02	0.01	0.01	0.01	0.02	0.02	0.00
Highest 1h Outdoor	5.9E+3	2.3E+3	5.7E+3	3.9E+3	3.8E+3	6.9E+3	3.6E+3	4.6E+3	1.5E+3
Highest 1h Indoor ²	1.1E+2	2.7E+1	6.1E+1	4.0E+1	3.5E+1	7.0E+1	6.0E+1	6.5E+1	3.1E+1
Highest 1h In/Out	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Time of highest 1h Outdoor	2/27/14 20:49	3/1/14 0:56	3/1/14 22:13	3/2/14 22:08	3/3/14 19:43	3/5/14 2:46	3/5/14 20:41		
Corresponding highest 1h Indoor	2/28/14 0:02	3/1/14 1:25	3/1/14 22:42	3/2/14 23:47	3/3/14 21:23	3/5/14 3:18	3/5/14 21:08		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 2/28/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-2-C-4. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor/outdoor ratios for particles with aerodynamic diameters 6–100 nm based on difference between concentrations measured using the TSI 3787 CPC and the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.0E+4	9.3E+3	9.4E+3	9.9E+3	8.3E+3	6.3E+3	8.2E+3	8.8E+3	1.2E+3
Outdoor 24 SD	5.5E+3	5.8E+3	4.5E+3	4.7E+3	4.3E+3	5.2E+3	3.9E+3	4.8E+3	6.3E+2
Indoor 24h mean	2.0E+2	9.6E+1	1.2E+2	9.1E+1	8.4E+1	7.1E+1	8.1E+1	1.1E+2	4.1E+1
Indoor 24 SD	1.5E+2	2.9E+1	5.0E+1	2.3E+1	1.6E+1	3.6E+1	2.3E+1	4.7E+1	4.4E+1
24h mean In/Out	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Highest 8h Outdoor	2.0E+4	1.1E+4	1.4E+4	1.3E+4	1.4E+4	1.0E+4	9.6E+3	1.3E+4	3.3E+3
Highest 8h Indoor	1.0E+3	1.1E+2	1.8E+2	1.2E+2	1.2E+2	1.1E+2	7.3E+1	2.5E+2	3.1E+2
Highest 8 h In/Out	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01
Highest 1h Outdoor	2.0E+4	2.0E+4	2.1E+4	1.8E+4	1.6E+4	2.0E+4	1.4E+4	1.8E+4	2.4E+3
Highest 1h Indoor ²	1.0E+3	1.1E+2	1.8E+2	1.2E+2	1.2E+2	1.1E+2	7.3E+1	2.7E+2	3.1E+2
Highest 1h In/Out	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Time of highest 1h Outdoor	2/27/14 13:15	3/1/14 7:56	3/1/14 20:22	3/3/14 6:52	3/4/14 2:04	3/4/14 22:04	3/6/14 7:32		
Corresponding highest 1h Indoor	2/28/14 13:15	3/1/14 9:23	3/1/14 21:58	3/3/14 7:33	3/4/14 2:40	3/4/14 23:33	3/6/14 8:16		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 2/28/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-2-C-5. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor/outdoor ratios for particles with aerodynamic diameters 100–300 nm based on difference between concentrations measured using the TSI 3781 CPC with size selector and the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	2.4E+6	1.0E+6	2.2E+6	2.1E+6	1.7E+6	2.8E+6	1.9E+6	2.0E+6	5.2E+5
Outdoor 24 SD	1.5E+6	5.7E+5	1.5E+6	8.0E+5	8.1E+5	2.1E+6	9.4E+5	1.2E+6	4.9E+5
Indoor 24h mean	7.6E+4	2.3E+4	3.9E+4	3.3E+4	3.0E+4	4.3E+4	3.1E+4	3.9E+4	1.6E+4
Indoor 24 SD	3.7E+4	6.7E+3	1.9E+4	9.0E+3	7.1E+3	2.1E+4	1.1E+4	1.6E+4	1.0E+4
24h mean In/Out	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.01
Highest 8h Outdoor	4.0E+6	1.4E+6	3.7E+6	2.7E+6	2.5E+6	5.2E+6	3.9E+6	3.3E+6	1.2E+6
Highest 8h Indoor	1.0E+5	2.7E+4	6.0E+4	4.0E+4	3.4E+4	6.9E+4	5.9E+4	5.6E+4	2.4E+4
Highest 8 h In/Out	0.03	0.02	0.02	0.01	0.01	0.01	0.02	0.02	0.00
Highest 1h Outdoor	5.9E+6	2.3E+6	5.7E+6	3.9E+6	3.7E+6	6.8E+6	3.5E+6	4.5E+6	1.5E+6
Highest 1h Indoor ²	1.0E+5	2.7E+4	6.0E+4	4.0E+4	3.4E+4	6.9E+4	5.9E+4	6.5E+4	3.1E+4
Highest 1h In/Out	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Time of highest 1h Outdoor	2/27/14 20:49	3/1/14 0:56	3/1/14 22:13	3/2/14 22:08	3/3/14 19:43	3/5/14 2:46	3/5/14 20:41		
Corresponding highest 1h Indoor	2/28/14 0:02	3/1/14 1:25	3/1/14 22:42	3/2/14 23:47	3/3/14 21:23	3/5/14 3:17	3/5/14 21:08		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 2/28/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-2-C-6. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.3–0.4 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	9.8E+3	4.5E+3	7.6E+3	1.6E+4	1.8E+4	2.1E+4	2.9E+4	1.5E+4	7.9E+3
Outdoor 24 SD	7.7E+3	2.3E+3	6.8E+3	1.0E+4	1.3E+4	1.6E+4	2.2E+4	1.1E+4	6.2E+3
Indoor 24h mean	6.2E+2	1.5E+2	1.6E+2	1.6E+2	1.8E+2	2.3E+2	1.8E+2	2.4E+2	1.6E+2
Indoor 24 SD	7.1E+2	3.6E+1	3.7E+1	5.1E+1	7.8E+1	8.3E+1	5.0E+1	1.5E+2	2.3E+2
24h mean In/Out	0.24	0.04	0.03	0.02	0.01	0.01	0.01	0.05	0.08
Highest 8h Outdoor	1.8E+4	6.6E+3	1.3E+4	2.5E+4	2.5E+4	3.7E+4	5.2E+4	2.5E+4	1.4E+4
Highest 8h Indoor	5.5E+2	1.7E+2	1.9E+2	2.1E+2	2.1E+2	3.1E+2	2.3E+2	2.7E+2	1.2E+2
Highest 8 h In/Out	0.03	0.03	0.01	0.01	0.01	0.01	0.00	0.01	0.01
Highest 1h Outdoor	2.5E+4	9.0E+3	2.4E+4	3.3E+4	5.6E+4	5.5E+4	6.7E+4	3.8E+4	2.0E+4
Highest 1h Indoor ²	5.5E+2	1.7E+2	1.9E+2	2.1E+2	2.1E+2	3.1E+2	2.3E+2	3.6E+2	1.6E+2
Highest 1h In/Out	0.03	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.01
Time of highest 1h Outdoor	2/27/14 21:21	2/28/14 18:23	3/1/14 22:16	3/3/14 8:07	3/4/14 6:51	3/5/14 3:46	3/5/14 22:40		
Corresponding highest 1h Indoor	2/28/14 1:12	2/28/14 19:32	3/1/14 22:39	3/3/14 8:32	3/4/14 7:07	3/5/14 4:37	3/5/14 23:07		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 2/28/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-2-C-7. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.4–0.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.8E+3	9.6E+2	1.4E+3	2.0E+3	2.9E+3	3.3E+3	5.1E+3	2.5E+3	1.3E+3
Outdoor 24 SD	1.3E+3	4.2E+2	1.3E+3	1.1E+3	2.9E+3	2.6E+3	3.8E+3	1.9E+3	1.1E+3
Indoor 24h mean	1.5E+2	4.1E+1	4.1E+1	3.6E+1	4.2E+1	4.7E+1	3.9E+1	5.6E+1	3.7E+1
Indoor 24 SD	1.7E+2	8.3E+0	6.9E+0	7.2E+0	1.5E+1	1.3E+1	7.1E+0	3.3E+1	5.8E+1
24h mean In/Out	0.27	0.05	0.04	0.02	0.01	0.02	0.01	0.06	0.09
Highest 8h Outdoor	3.1E+3	1.3E+3	2.3E+3	2.8E+3	3.9E+3	5.9E+3	8.9E+3	4.0E+3	2.4E+3
Highest 8h Indoor	1.1E+2	4.5E+1	4.5E+1	4.0E+1	5.1E+1	5.8E+1	4.4E+1	5.6E+1	2.4E+1
Highest 8 h In/Out	0.04	0.03	0.02	0.01	0.01	0.01	0.00	0.02	0.01
Highest 1h Outdoor	4.3E+3	1.8E+3	4.5E+3	3.9E+3	1.3E+4	9.0E+3	1.2E+4	6.9E+3	4.1E+3
Highest 1h Indoor ²	1.1E+2	4.5E+1	4.5E+1	4.0E+1	5.1E+1	5.8E+1	4.4E+1	7.4E+1	3.3E+1
Highest 1h In/Out	0.03	0.03	0.01	0.01	0.01	0.01	0.00	0.02	0.01
Time of highest 1h Outdoor	2/27/14 23:43	2/28/14 18:23	3/1/14 22:14	3/2/14 23:37	3/4/14 6:48	3/5/14 3:42	3/5/14 22:40		
Corresponding highest 1h Indoor	2/28/14 1:28	2/28/14 19:54	3/1/14 22:42	3/2/14 23:57	3/4/14 7:05	3/5/14 4:33	3/5/14 23:34		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 2/28/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-2-C-8. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.5–0.7 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.4E+3	8.6E+2	9.6E+2	1.2E+3	1.5E+3	1.7E+3	2.6E+3	1.5E+3	5.4E+2
Outdoor 24 SD	6.8E+2	2.9E+2	7.3E+2	5.3E+2	1.2E+3	1.3E+3	1.5E+3	8.9E+2	4.1E+2
Indoor 24h mean	1.7E+2	3.1E+1	2.8E+1	2.4E+1	2.6E+1	2.8E+1	2.5E+1	4.8E+1	5.1E+1
Indoor 24 SD	2.9E+2	7.6E+0	6.1E+0	4.6E+0	7.7E+0	6.4E+0	6.7E+0	4.7E+1	9.8E+1
24h mean In/Out	0.34	0.06	0.03	0.02	0.02	0.02	0.01	0.07	0.11
Highest 8h Outdoor	2.1E+3	1.1E+3	1.5E+3	1.7E+3	1.8E+3	2.9E+3	4.0E+3	2.2E+3	9.2E+2
Highest 8h Indoor	8.4E+1	3.3E+1	2.7E+1	2.6E+1	2.6E+1	3.4E+1	2.8E+1	3.7E+1	2.0E+1
Highest 8 h In/Out	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.02	0.01
Highest 1h Outdoor	2.8E+3	1.4E+3	2.6E+3	2.2E+3	5.4E+3	4.3E+3	5.3E+3	3.4E+3	1.5E+3
Highest 1h Indoor ²	8.4E+1	3.3E+1	2.7E+1	2.6E+1	2.6E+1	3.4E+1	2.8E+1	4.7E+1	2.6E+1
Highest 1h In/Out	0.04	0.03	0.01	0.01	0.01	0.01	0.01	0.02	0.01
Time of highest 1h Outdoor	2/27/14 23:46	2/28/14 18:21	3/1/14 22:14	3/2/14 22:04	3/4/14 6:43	3/5/14 3:13	3/5/14 22:40		
Corresponding highest 1h Indoor	2/28/14 1:13	2/28/14 20:05	3/1/14 22:53	3/2/14 23:03	3/4/14 7:05	3/5/14 3:58	3/5/14 23:45		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 2/28/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-2-C-9. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.7–1.0 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	5.2E+2	3.3E+2	2.7E+2	3.5E+2	3.8E+2	3.4E+2	5.6E+2	3.9E+2	9.9E+1
Outdoor 24 SD	1.7E+2	1.1E+2	1.2E+2	2.1E+2	1.5E+2	2.2E+2	4.8E+2	2.1E+2	1.2E+2
Indoor 24h mean	8.1E+1	8.8E+0	7.1E+0	6.4E+0	6.2E+0	6.1E+0	7.2E+0	1.8E+1	2.6E+1
Indoor 24 SD	1.7E+2	3.0E+0	2.5E+0	1.8E+0	1.9E+0	1.8E+0	3.4E+0	2.6E+1	5.8E+1
24h mean In/Out	0.37	0.06	0.03	0.02	0.02	0.02	0.01	0.07	0.12
Highest 8h Outdoor	7.1E+2	3.9E+2	3.8E+2	5.5E+2	5.0E+2	5.8E+2	7.8E+2	5.5E+2	1.4E+2
Highest 8h Indoor	8.0E+2	9.9E+0	9.9E+0	7.0E+0	6.3E+0	6.8E+0	8.0E+0	1.2E+2	2.8E+2
Highest 8 h In/Out	1.14	0.03	0.03	0.01	0.01	0.01	0.01	0.18	0.39
Highest 1h Outdoor	8.4E+2	5.1E+2	5.2E+2	9.0E+2	6.6E+2	8.0E+2	2.3E+3	9.3E+2	5.6E+2
Highest 1h Indoor ²	8.0E+2	9.9E+0	9.9E+0	7.0E+0	6.3E+0	6.8E+0	8.0E+0	1.3E+1	9.4E+0
Highest 1h In/Out	0.04	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01
Time of highest 1h Outdoor	2/27/14 21:20	2/28/14 14:24	3/1/14 22:14	3/2/14 20:09	3/3/14 19:20	3/5/14 2:51	3/6/14 8:51		
Corresponding highest 1h Indoor	2/27/14 23:53	2/28/14 16:03	3/1/14 22:33	3/2/14 21:08	3/3/14 23:20	3/5/14 5:38	3/6/14 8:51		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 2/28/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-2-C-10. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 1.0–2.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	4.3E+2	2.1E+2	1.8E+2	2.1E+2	2.8E+2	1.9E+2	3.2E+2	2.6E+2	8.5E+1
Outdoor 24 SD	4.9E+2	7.8E+1	5.7E+1	1.4E+2	1.2E+2	9.9E+1	2.9E+2	1.8E+2	1.4E+2
Indoor 24h mean	1.3E+2	6.0E+0	4.2E+0	4.0E+0	4.3E+0	3.6E+0	4.7E+0	2.3E+1	4.5E+1
Indoor 24 SD	3.3E+2	2.3E+0	1.9E+0	1.4E+0	1.6E+0	1.4E+0	2.2E+0	4.9E+1	1.2E+2
24h mean In/Out	0.81	0.08	0.03	0.02	0.02	0.02	0.01	0.14	0.27
Highest 8h Outdoor	6.2E+2	2.8E+2	2.2E+2	3.3E+2	4.0E+2	2.8E+2	5.0E+2	3.8E+2	1.3E+2
Highest 8h Indoor	1.8E+3	9.7E+0	3.6E+0	4.3E+0	3.9E+0	3.7E+0	5.7E+0	2.6E+2	6.3E+2
Highest 8 h In/Out	2.90	0.03	0.02	0.01	0.01	0.01	0.01	0.43	1.01
Highest 1h Outdoor	1.3E+3	3.8E+2	2.9E+2	5.9E+2	5.0E+2	3.9E+2	1.0E+3	6.4E+2	3.5E+2
Highest 1h Indoor ²	1.8E+3	9.7E+0	3.6E+0	4.3E+0	3.9E+0	3.7E+0	5.7E+0	1.5E+1	2.3E+1
Highest 1h In/Out	0.06	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02
Time of highest 1h Outdoor	2/27/14 23:21	2/28/14 14:23	3/1/14 22:14	3/2/14 20:11	3/3/14 15:58	3/5/14 2:51	3/6/14 8:51		
Corresponding highest 1h Indoor	2/28/14 0:09	2/28/14 16:34	3/1/14 22:45	3/2/14 22:14	3/3/14 18:32	3/5/14 2:58	3/6/14 8:51		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 2/28/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-2-C-11. Summary statistics for estimated PM_{2.5} concentrations ($\mu\text{g m}^{-3}$) calculated from particle number concentrations resolved by size from 6 nm to 2.5 microns (as reported in Tables FW-2-C-2 to FW-2-C-9) and resulting indoor/outdoor ratios.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.5E+1	7.2E+0	1.2E+1	1.2E+1	1.1E+1	1.5E+1	1.3E+1	1.2E+1	2.4E+0
Outdoor 24 SD	7.8E+0	3.0E+0	6.6E+0	4.0E+0	4.4E+0	1.0E+1	6.4E+0	6.0E+0	2.3E+0
Indoor 24h mean	1.3E+0	1.6E-1	2.2E-1	1.9E-1	1.7E-1	2.2E-1	1.8E-1	3.4E-1	3.7E-1
Indoor 24 SD	2.3E+0	3.4E-2	7.5E-2	4.5E-2	3.7E-2	9.1E-2	4.6E-2	3.8E-1	8.0E-1
24h mean In/Out	0.23	0.04	0.02	0.02	0.01	0.02	0.01	0.05	0.08
Highest 8h Outdoor	2.2E+1	9.2E+0	1.9E+1	1.5E+1	1.5E+1	2.6E+1	2.1E+1	1.8E+1	5.1E+0
Highest 8h Indoor	6.5E-1	1.8E-1	3.0E-1	2.1E-1	1.9E-1	3.4E-1	2.9E-1	3.1E-1	1.5E-1
Highest 8 h In/Out	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.01
Highest 1h Outdoor	3.1E+1	1.2E+1	2.8E+1	2.0E+1	2.2E+1	3.4E+1	2.3E+1	2.4E+1	6.8E+0
Highest 1h Indoor ²	6.5E-1	1.8E-1	3.0E-1	2.1E-1	1.9E-1	3.4E-1	2.9E-1	3.9E-1	2.8E-1
Highest 1h In/Out	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01
Time of highest 1h Outdoor	2/27/14 21:20	3/1/14 0:55	3/1/14 22:13	3/2/14 22:00	3/3/14 19:26	3/5/14 2:47	3/5/14 20:38		
Corresponding highest 1h Indoor	2/28/14 0:09	3/1/14 1:17	3/1/14 22:42	3/2/14 23:36	3/3/14 21:25	3/5/14 3:23	3/5/14 23:43		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 2/28/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-2-C-12. Summary statistics for concentrations of PM_{2.5} ($\mu\text{g m}^{-3}$) and indoor /outdoor ratios from measurements reported by TSI DustTrak II.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.7E-3	1.4E-3	1.5E-3	1.1E-3	1.2E-3	1.3E-3	1.5E-3	1.4E-3	1.9E-4
Outdoor 24 SD	1.4E-3	3.3E-4	5.6E-4	4.6E-4	3.8E-4	4.2E-4	8.1E-4	6.3E-4	3.6E-4
Indoor 24h mean	6.9E-3	1.7E-3	5.2E-3	7.0E-3	7.7E-3	1.3E-2	1.4E-2	7.8E-3	3.8E-3
Indoor 24 SD	5.4E-3	1.0E-3	4.2E-3	4.2E-3	5.7E-3	9.9E-3	1.0E-2	5.8E-3	3.1E-3
24h mean In/Out	0.49	0.57	0.45	0.26	0.15	0.16	0.08	0.31	0.18
Highest 8h Outdoor	1.3E-2	3.0E-3	9.0E-3	1.0E-2	1.0E-2	2.3E-2	2.4E-2	1.3E-2	7.2E-3
Highest 8h Indoor	1.4E-3	1.7E-3	1.7E-3	1.5E-3	1.5E-3	1.8E-3	1.0E-3	1.5E-3	2.3E-4
Highest 8 h In/Out	0.11	0.56	0.19	0.15	0.14	0.08	0.04	0.18	0.16
Highest 1h Outdoor	1.6E-2	4.7E-3	1.6E-2	1.4E-2	2.2E-2	3.3E-2	3.0E-2	2.0E-2	9.0E-3
Highest 1h Indoor ²	1.4E-3	1.7E-3	1.7E-3	1.5E-3	1.5E-3	1.8E-3	1.0E-3	1.6E-3	4.6E-4
Highest 1h In/Out	0.12	0.21	0.09	0.07	0.10	0.06	0.04	0.10	0.05
Time of highest 1h Outdoor	2/27/14 21:22	3/1/14 9:00	3/1/14 22:10	3/2/14 22:06	3/3/14 19:26	3/5/14 3:42	3/5/14 22:36		
Corresponding highest 1h Indoor	2/27/14 23:52	3/1/14 9:00	3/2/14 2:10	3/2/14 22:06	3/3/14 21:17	3/5/14 4:33	3/6/14 2:36		

¹Based on 24h periods starting / ending at 10am. Day 1 starts at 2/28/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-2-C-13. Daily¹ summary statistics for concentrations (nanograms m^{-3}) and indoor /outdoor ratios of aerosol black carbon measured using the Aethalometer AE22.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	3.3E+2	2.8E+2	2.3E+2	4.8E+2	4.2E+2	7.4E+2	4.9E+2	4.2E+2	1.6E+2
Outdoor 24 SD	2.1E+2	2.3E+2	1.8E+2	3.2E+2	2.9E+2	5.1E+2	2.9E+2	2.9E+2	1.0E+2
Indoor 24h mean	5.6E+1	5.6E+1	8.0E+1	4.6E+1	4.6E+1	4.7E+1	4.6E+1	5.4E+1	1.2E+1
Indoor 24 SD	5.0E+1	6.9E+1	1.4E+2	1.9E+1	2.2E+1	3.3E+1	2.5E+1	5.1E+1	3.9E+1
24h mean In/Out	0.25	0.15	0.37	0.19	0.09	0.11	0.07	0.17	0.10
Highest 8h Outdoor	5.0E+2	4.6E+2	3.8E+2	7.0E+2	7.0E+2	1.3E+3	8.0E+2	6.9E+2	2.7E+2
Highest 8h Indoor	5.1E+1	4.5E+1	7.6E+1	4.5E+1	4.5E+1	4.9E+1	4.8E+1	5.1E+1	1.0E+1
Highest 8 h In/Out	0.10	0.10	0.20	0.06	0.06	0.04	0.06	0.09	0.05
Highest 1h Outdoor	7.6E+2	7.1E+2	6.6E+2	8.7E+2	7.8E+2	1.8E+3	8.1E+2	9.1E+2	3.5E+2
Highest 1h Indoor ²	5.1E+1	4.5E+1	7.6E+1	4.5E+1	4.5E+1	4.9E+1	4.8E+1	5.7E+1	1.4E+1
Highest 1h In/Out	0.10	0.06	0.11	0.05	0.06	0.04	0.06	0.07	0.02
Time of highest 1h Outdoor	2/27/14 21:08	2/28/14 16:50	3/1/14 22:17	3/3/14 9:21	3/3/14 21:01	3/5/14 2:52	3/5/14 22:39		
Corresponding highest 1h Indoor	2/27/14 21:35	2/28/14 16:50	3/1/14 22:17	3/3/14 9:21	3/3/14 21:01	3/5/14 3:19	3/5/14 22:39		

¹Based on 24h periods starting / ending at 10am. Day 1 starts at 2/28/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Appendix FW-3-E. Results for System E, October 29–November 4, 2014.

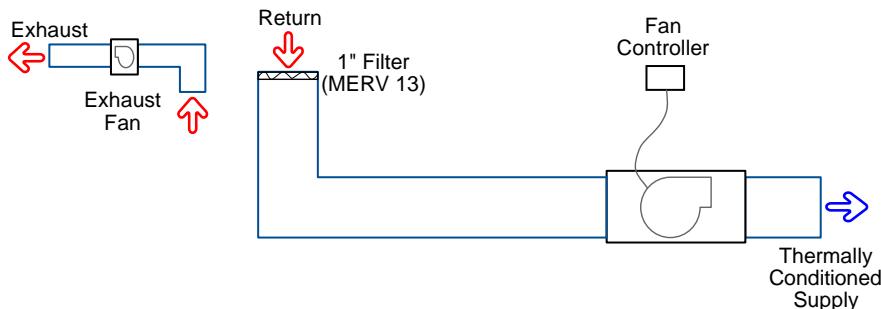


Table FW-3-E-1. Description of **System E** component characteristics during the period of **October 29 – November 4, 2014**.

System Parameter	Description or Measured Value
Heating	75,000 BTU/h, 80% eff., gas furnace, 1-stage burner
Cooling	3 ton, SEER13 air conditioner
Thermal distribution	Central fan with PSC motor: 1142 cfm for cooling, 1032 cfm for heating
Ventilation	Exhaust fan in main bathroom with ECM; Set to 38 cfm continuous
Filtration	MERV13, 1" (AirGaurd DPgreen13) filter installed at return air ceiling grill of forced air furnace. Some particle removal as air infiltrates through building envelope to replace air exiting home through continuous exhaust fan in bathroom.
Recirculation blower schedule	As required for thermal conditioning, with fan cycler providing a minimum of 20 minutes per hour.
VOC removal system	None

Notes about this monitoring period

We started the operational period with a single CPC 3787, and it malfunctioned midway through. We lost a DustTrak at the end of the operational period. All of the other instruments were functioning normally.

The 24 h running statistics in the figures starts at 10/28/2014 20:30.

It rained during the day on 10/31/2014, and during the early morning hours of 11/1/2014.

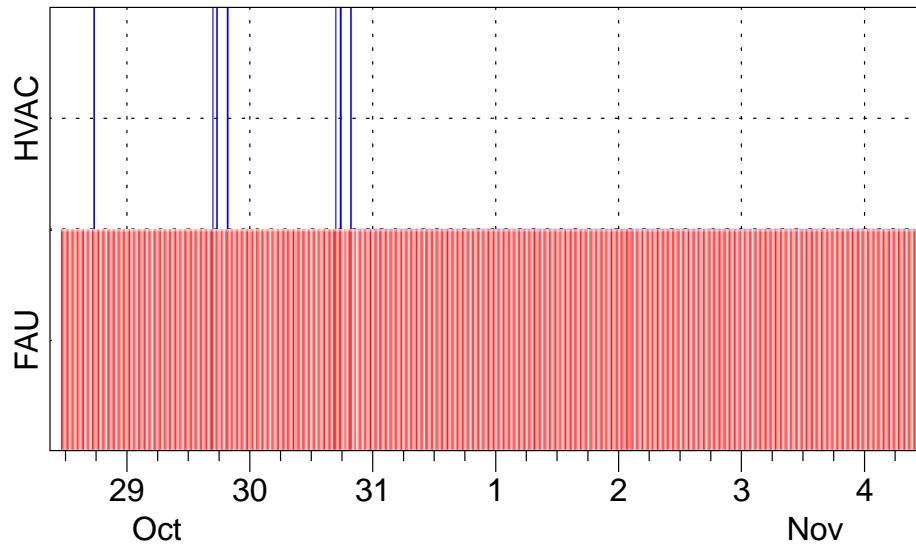


Figure FW-3-E-1. Operation of mechanical systems: central air-conditioning (AC); fan on central forced air unit (FAU).

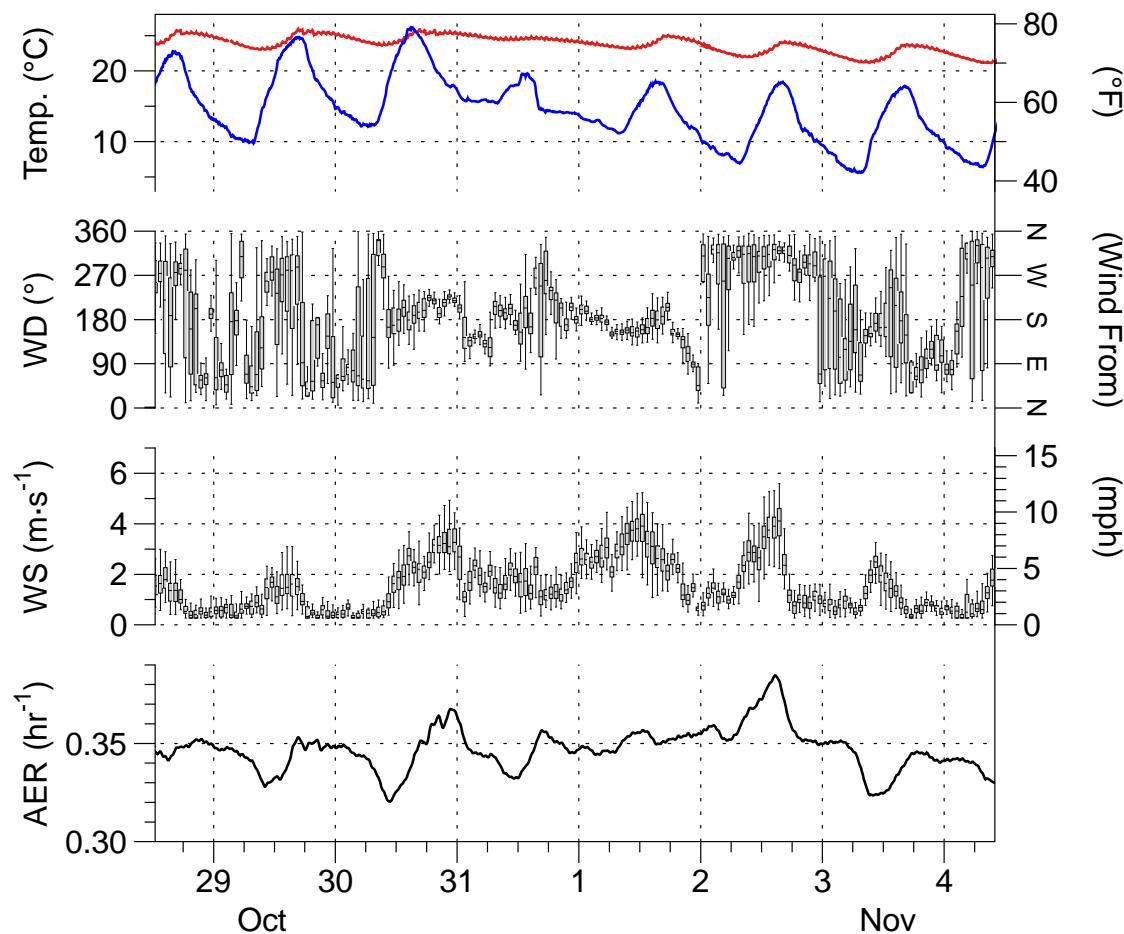


Figure FW-3-E-2. Environmental parameters measured during operation of System E, Oct 29–Nov 4, 2014. From top to bottom: indoor (red) and outdoor (blue) temperatures, wind direction (WD) in units of degrees from North, wind speed (WS), and air exchange rate (AER). For WD and WS, the box for each hour shows the 25th, 50th and 75th percentiles of the measured values and whiskers extend 1.5X the interquartile range (75th–25th percentile values) above the 75th and below the 25th percentile values.

Guide to plots of pollutant concentration time series and indoor / outdoor (I/O) ratios

The bottom section of each plot shows outdoor and indoor time series using the resolution of data collection: 3-min for black carbon and 1-min for all other parameters. The top and bottom of grey band are LOESS-smoothed, 1-min (or 3-min for black carbon) time-series. Also shown are time series with 1h and 24h time averaging for most pollutants. Triangles in bottom of plot indicate the highest 1h outdoor and corresponding highest 1h indoor average during each day. The top section of each plot shows the ratio of indoor to outdoor running 24h mean values (8h for ozone) and the ratios of highest 1h indoor to corresponding highest 1h outdoor concentration each day.

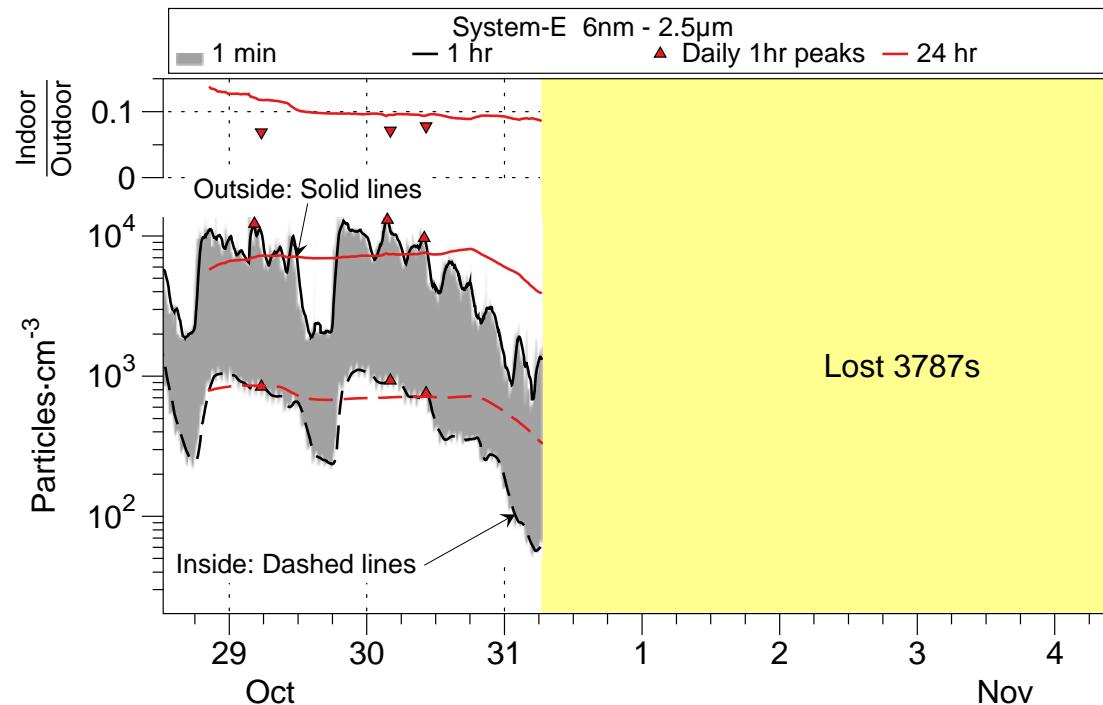


Figure FW-3-E-3. Number concentrations of 6 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of System E, Oct 29–Nov 4, 2014. Data collected using TSI 3787 CPCs.

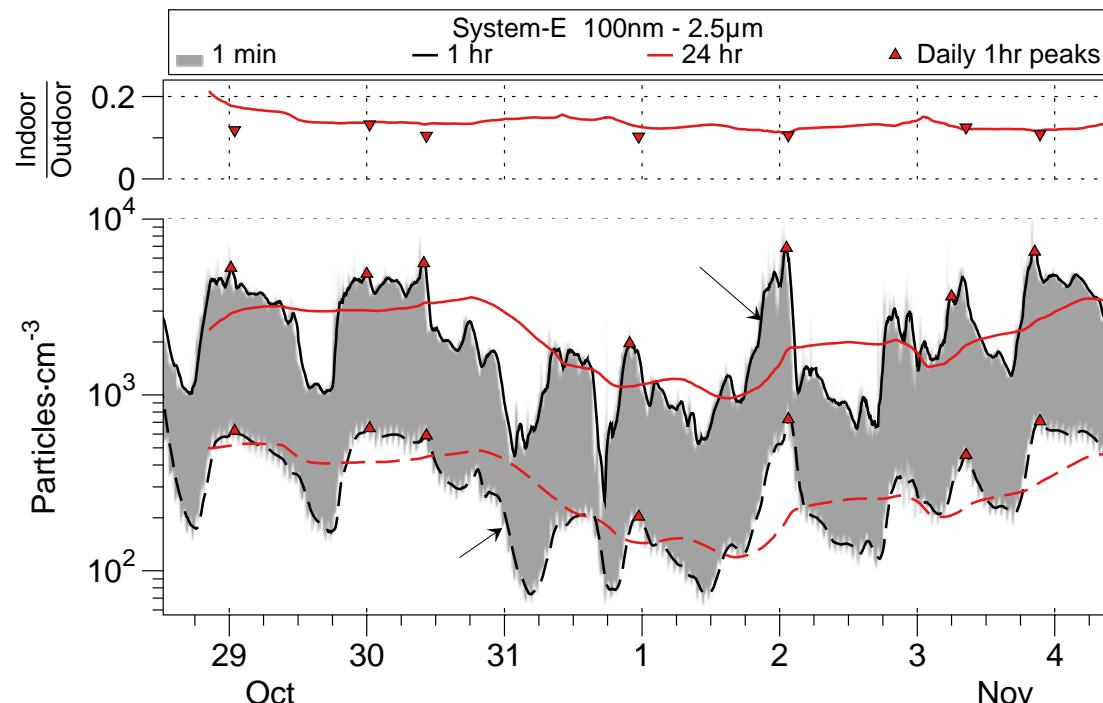


Figure FW-3-E-4. Number concentrations of 100 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of System E, Oct 29–Nov 4, 2014. Data collected using TSI 3781 CPCs outfitted with screens to exclude particles smaller than 100 nm. Refer to “Guide” before Figure FW-3-E-3.

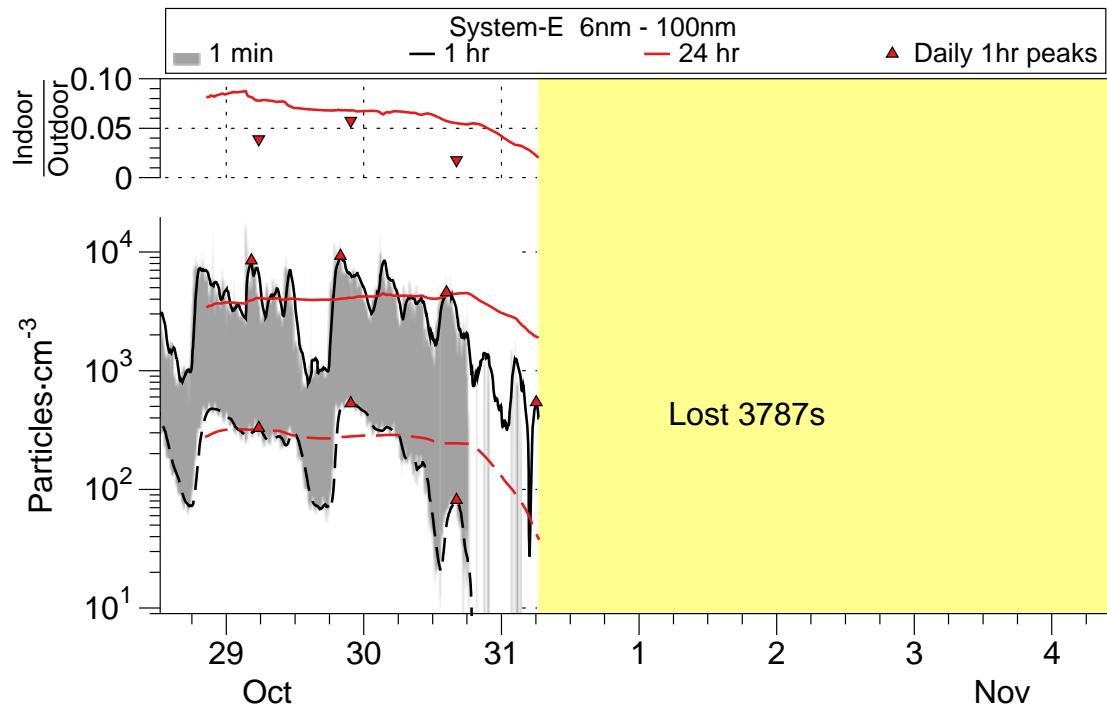


Figure FW-3-E-5. Number concentrations of 6–100 nm diameter particles measured outdoors and indoors during operation of System E, Oct 29–Nov 4, 2014. Data obtained as the difference between time series shown in prior two figures. Refer to “Guide” before Figure FW-3-E-3.

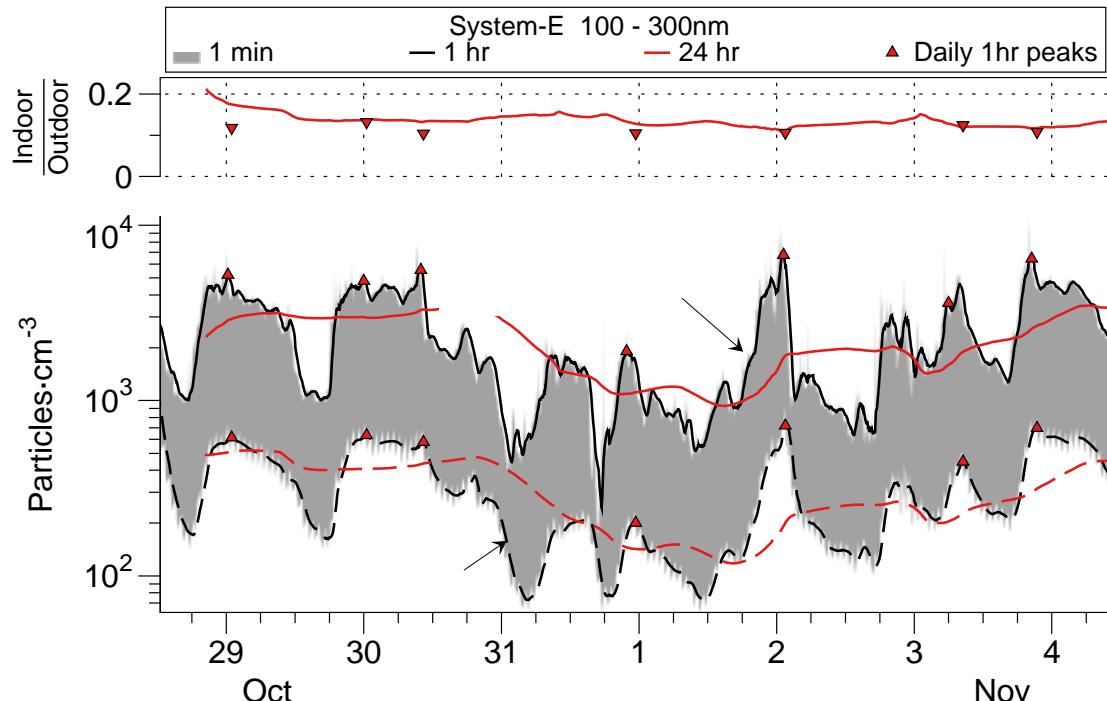


Figure FW-3-E-6. Figure FW-3-E-6. Number concentrations of 100–300 nm diameter particles measured outdoors and indoors during operation of System E, Oct 29–Nov 4, 2014. Data obtained as the difference between the TSI 3781 CPC with size selector and the MetOne BT637S OPC. Refer to “Guide” before Figure FW-3-E-3.

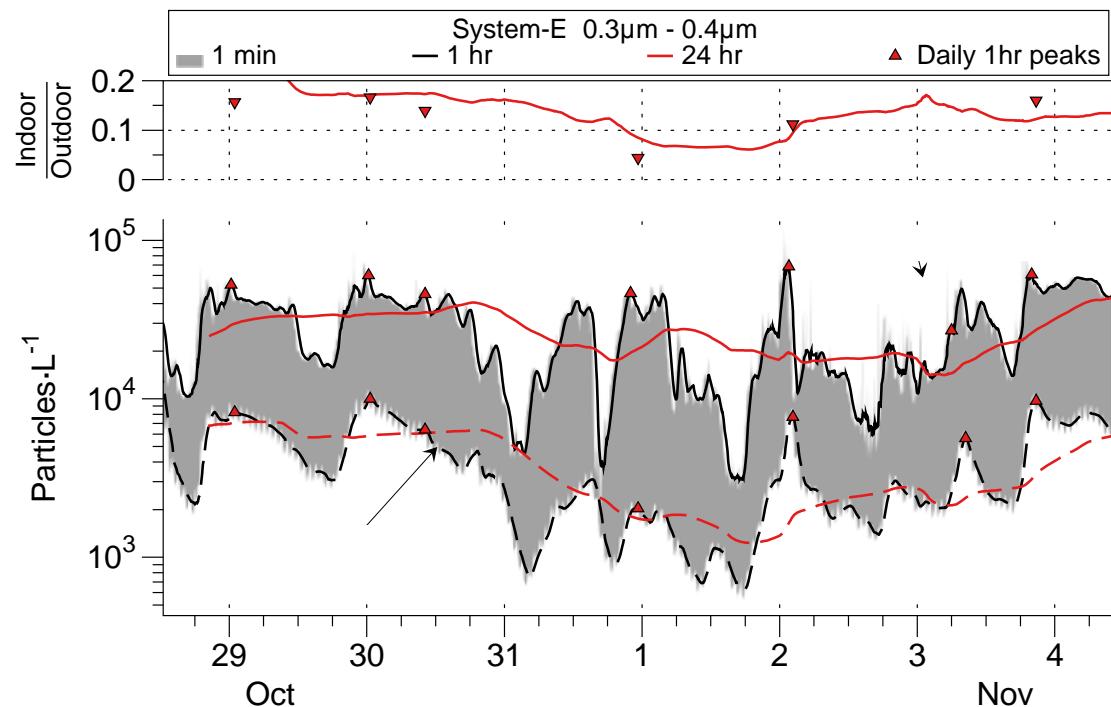


Figure FW-3-E-7. Number concentrations of 0.3–0.4 μm diameter particles measured outdoors and indoors during operation of System E, Oct 29–Nov 4, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-3-E-3.

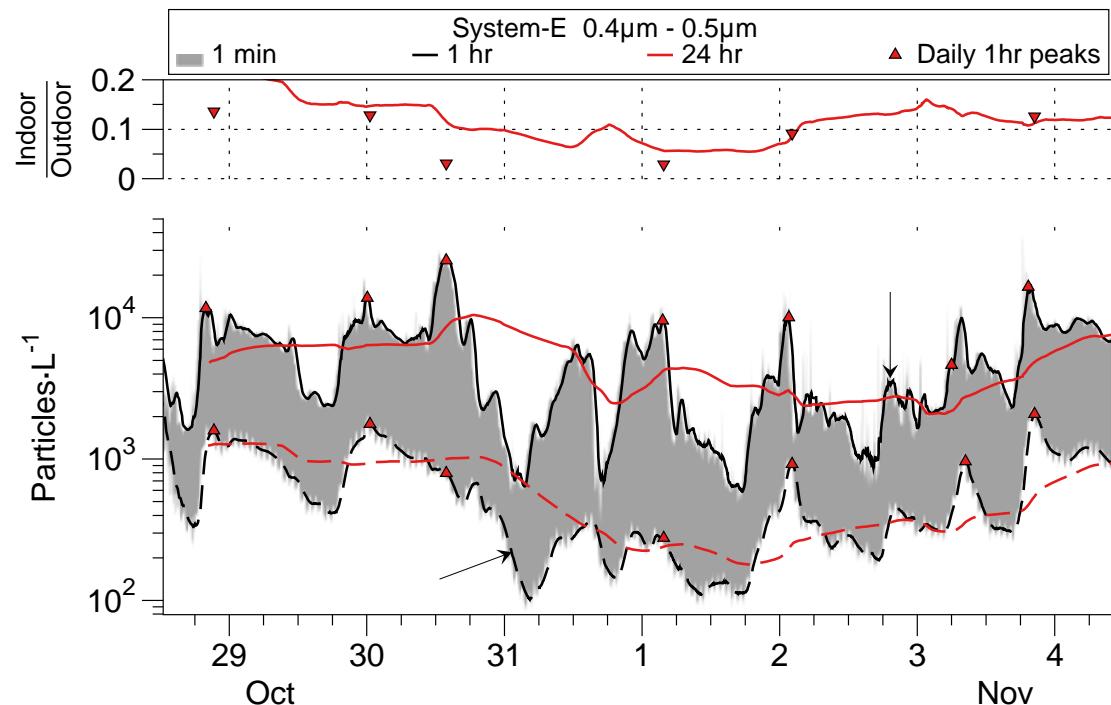


Figure FW-3-E-8. Number concentrations of 0.4–0.5 μm diameter particles measured outdoors and indoors during operation of System E, Oct 29–Nov 4, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-3-E-3.

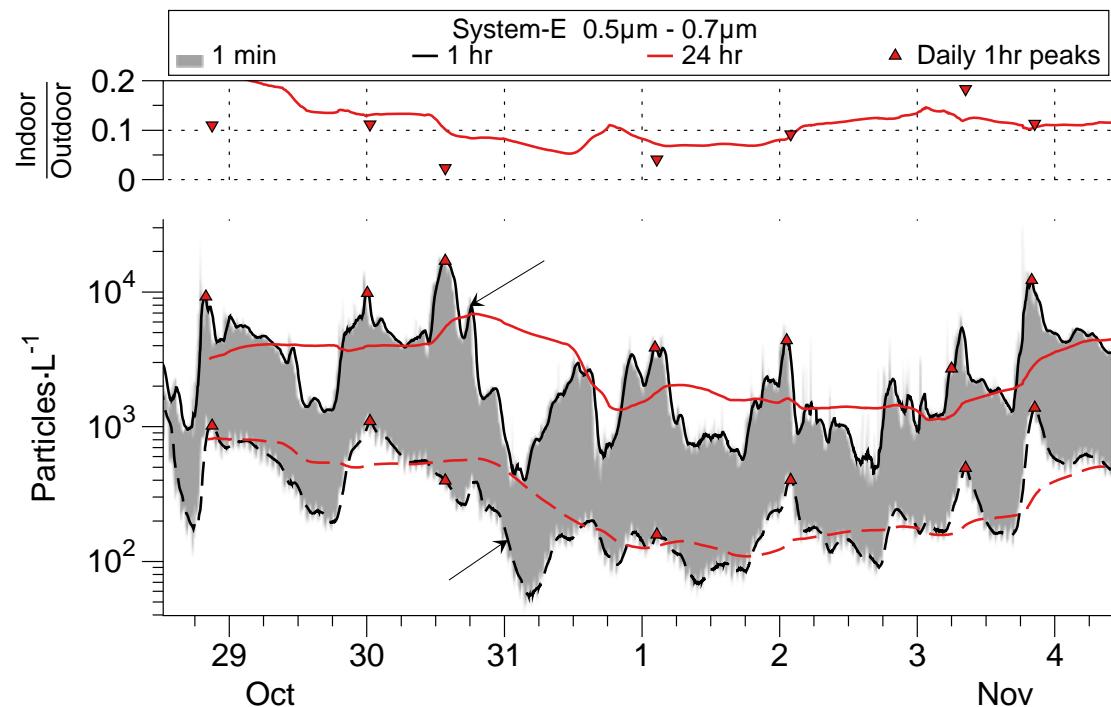


Figure FW-3-E-9. Number concentrations of 0.5–0.7 μm diameter particles measured outdoors and indoors during operation of System E, Oct 29–Nov 4, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-3-E-3.

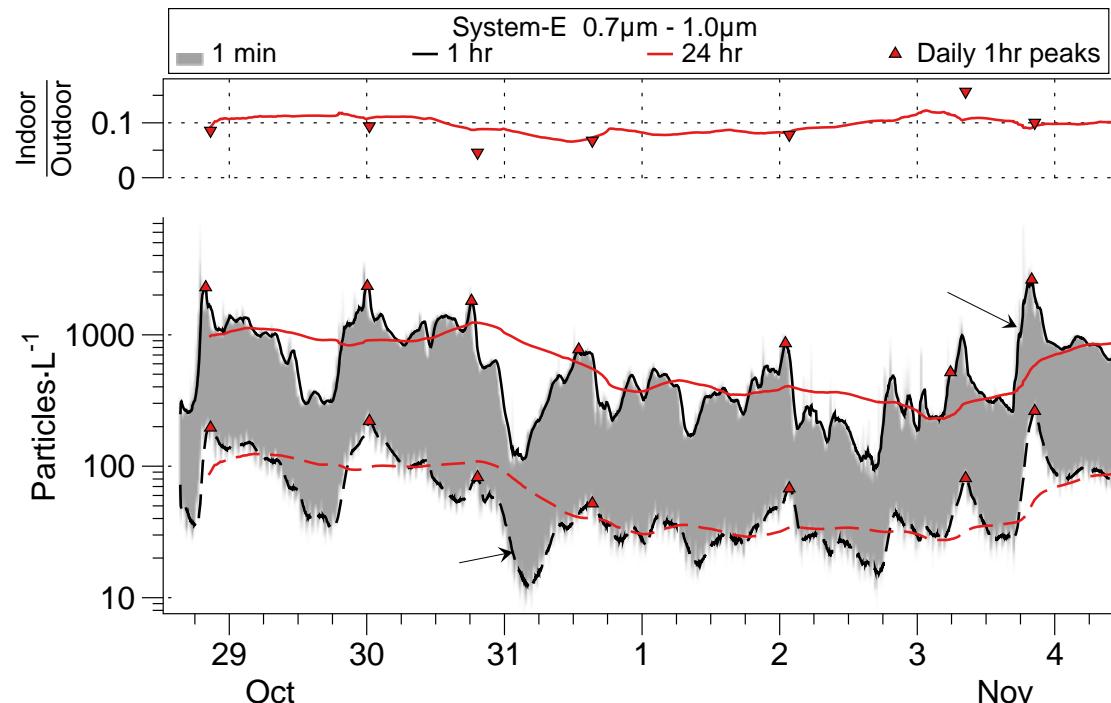


Figure FW-3-E-10. Number concentrations of 0.7–1.0 μm diameter particles measured outdoors and indoors during operation of System E, Oct 29–Nov 4, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-3-E-3.

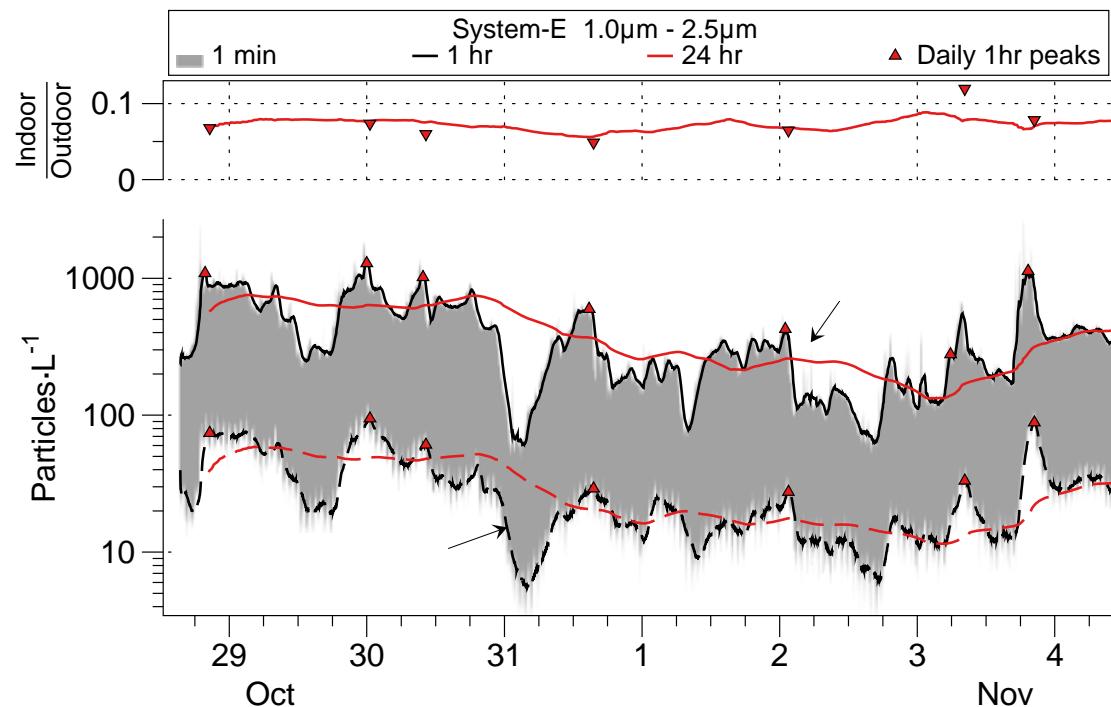


Figure FW-3-E-11. Number concentrations of 1.0–2.5 μm diameter particles measured outdoors and indoors during operation of System E, Oct 29–Nov 4, 2014. Data collected using MetOne BT637S particle counters. Refer to Figure FW-3-E-3 for details.

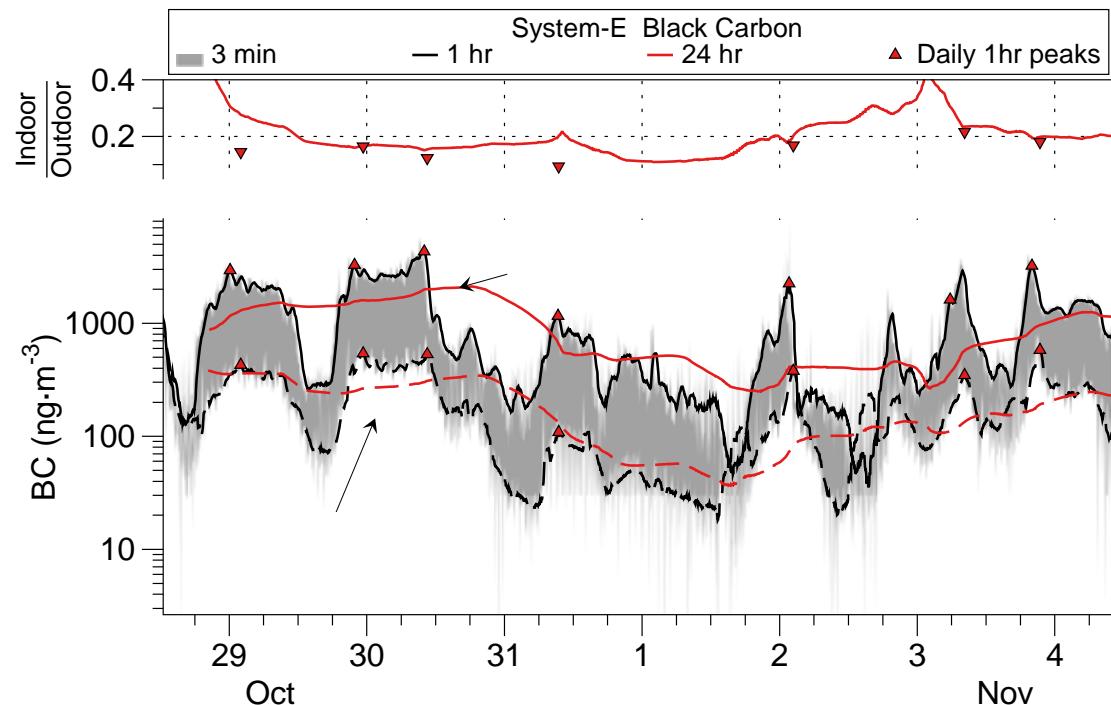


Figure FW-3-E-12. Black carbon concentrations measured outdoors and indoors during operation of System E, Oct 29–Nov 4, 2014. Data collected using AE22 Aethalometers with 3-min samples. Data otherwise as described in Figure FW-3-E-3 caption.

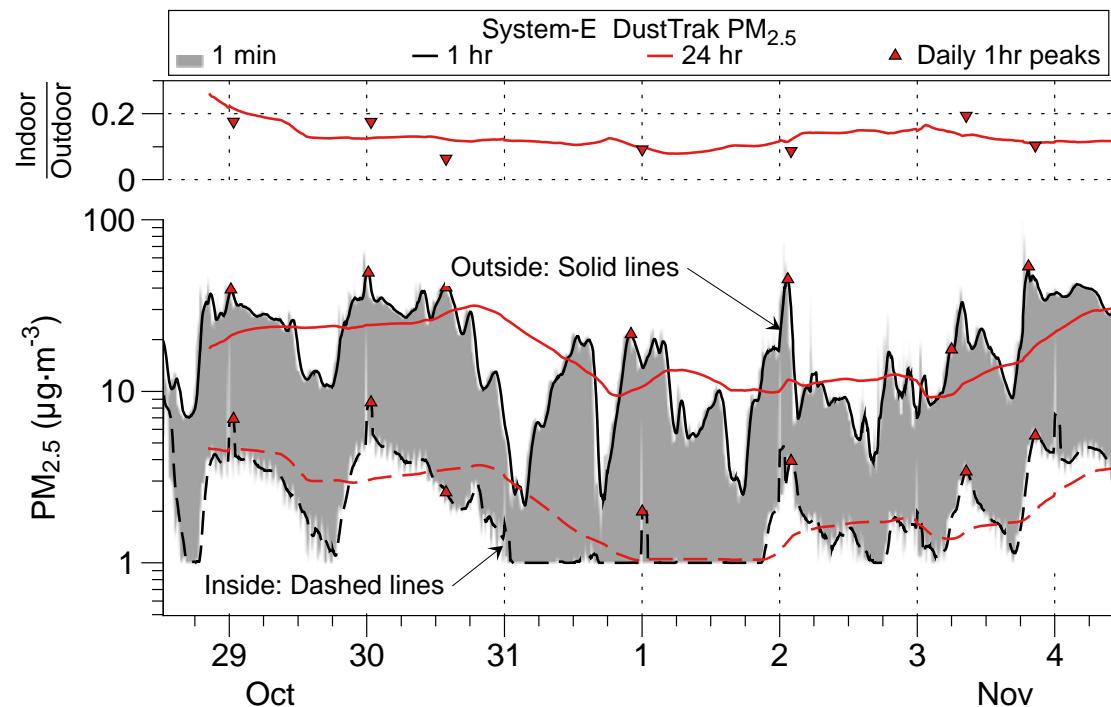


Figure FW-3-E-13. PM_{2.5} reported by TSI DustTrak II 8530 measurements outdoors and indoors during operation of System E, Oct 29-Nov 4, 2014. The DustTrak measures light scattering and uses a calibration to estimate PM_{2.5} mass. Refer to “Guide” before Figure FW-3-E-3.

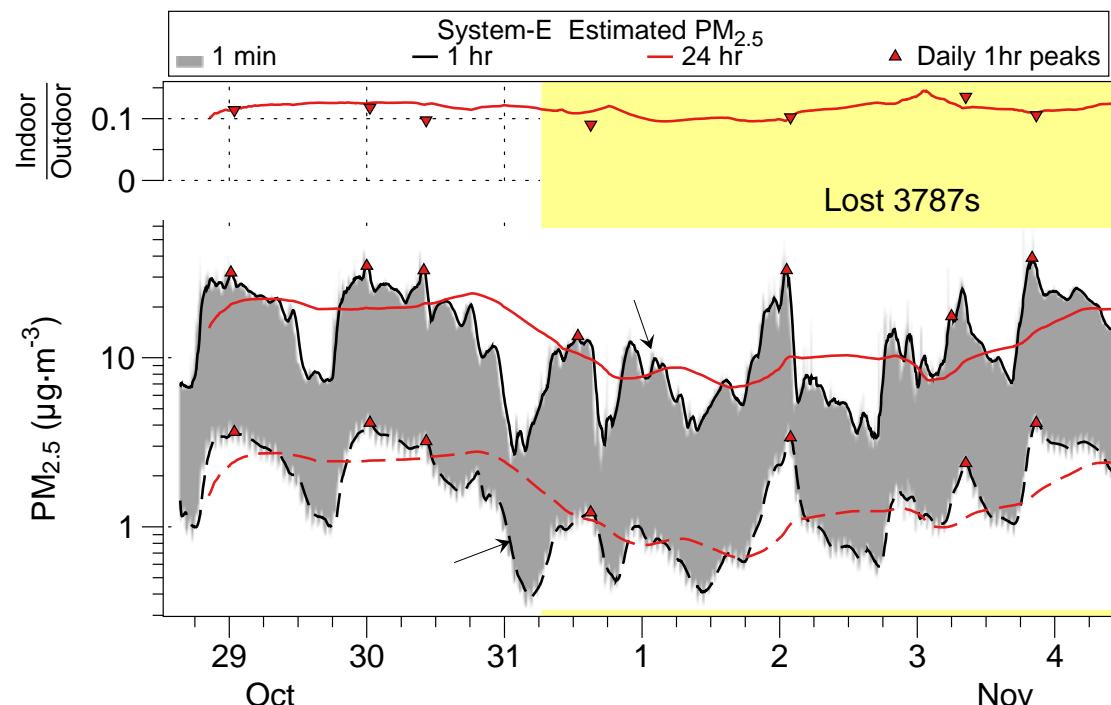


Figure FW-3-E-14. Estimated PM_{2.5} concentration calculated from size-resolved particle number concentrations measured by MetOne and CPC during operation of System E, Oct 29-Nov 4, 2014. Details provided in body of report. Refer to “Guide” before Figure FW-3-E-3.

Table FW-3-E-2. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6 nm to 2.5 micron measured using the TSI 3787 CPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	7.3E+3	7.4E+3	4.0E+3	4.5E+2	7.8E-1	4.9E-1	1.7E+0	2.7E+3	3.2E+3
Outdoor 24 SD	3.5E+3	3.6E+3	2.6E+3	6.3E+2	3.4E-1	2.3E-1	1.2E+0	1.5E+3	1.6E+3
Indoor 24h mean	8.5E+2	7.1E+2	3.5E+2	3.0E+1	6.4E-2	4.8E-2	1.4E-1	2.8E+2	3.4E+2
Indoor 24 SD	3.9E+2	2.9E+2	2.2E+2	3.5E+1	2.6E-2	1.7E-2	9.9E-2	1.3E+2	1.5E+2
24h mean In/Out	0.15	0.10	0.09	0.08	0.08	0.09	0.09	0.10	0.02
Highest 8h Outdoor	1.2E+4	1.0E+4	9.6E+3	1.4E+3	4.2E+0	8.7E-1	2.8E+0	4.7E+3	5.1E+3
Highest 8h Indoor	1.6E+3	1.0E+3	9.7E+2	7.9E+1	2.1E-1	8.2E-2	2.4E-1	5.2E+2	6.0E+2
Highest 8 h In/Out	0.13	0.10	0.10	0.06	0.05	0.09	0.09	0.09	0.03
Highest 1h Outdoor	1.2E+4	1.3E+4	9.7E+3	1.9E+3	1.8E+0	9.3E-1	5.3E+0	5.3E+3	5.6E+3
Highest 1h Indoor ²	1.6E+3	1.0E+3	9.7E+2	7.9E+1	2.1E-1	8.2E-2	2.4E-1	3.8E+2	4.1E+2
Highest 1h In/Out	0.07	0.07	0.08	0.05	0.07	0.15	0.08	0.08	0.03
Time of highest 1h Outdoor	10/29/14 4:24	10/30/14 3:36	10/30/14 10:00	10/31/14 9:42	11/2/14 1:07	11/3/14 6:00	11/3/14 19:23		
Corresponding highest 1h Indoor	10/29/14 5:36	10/30/14 4:07	10/30/14 10:20	10/31/14 9:42	11/2/14 1:35	11/3/14 8:21	11/3/14 20:30		

¹Based on 24h periods starting / ending at 6am. Day 1 starts at 10/28/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-3-E-3. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100 nm to 2.5 micron measured using the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	3.2E+3	3.1E+3	2.0E+3	1.2E+3	1.9E+3	1.6E+3	3.5E+3	2.4E+3	8.2E+2
Outdoor 24 SD	1.3E+3	1.3E+3	1.4E+3	4.9E+2	1.7E+3	9.2E+2	1.5E+3	1.2E+3	3.7E+2
Indoor 24h mean	5.3E+2	4.2E+2	3.1E+2	1.5E+2	2.4E+2	2.1E+2	4.5E+2	3.3E+2	1.3E+2
Indoor 24 SD	2.6E+2	1.7E+2	1.6E+2	4.6E+1	1.9E+2	7.6E+1	1.8E+2	1.5E+2	6.6E+1
24h mean In/Out	0.22	0.14	0.14	0.14	0.12	0.13	0.12	0.15	0.03
Highest 8h Outdoor	4.5E+3	4.4E+3	4.5E+3	1.6E+3	3.8E+3	3.1E+3	4.9E+3	3.8E+3	1.0E+3
Highest 8h Indoor	1.0E+3	6.0E+2	5.7E+2	2.0E+2	4.6E+2	4.3E+2	6.3E+2	5.6E+2	2.4E+2
Highest 8 h In/Out	0.23	0.14	0.13	0.12	0.12	0.14	0.13	0.14	0.04
Highest 1h Outdoor	5.3E+3	4.9E+3	5.6E+3	2.0E+3	6.9E+3	3.6E+3	6.5E+3	5.0E+3	1.6E+3
Highest 1h Indoor ²	1.0E+3	6.0E+2	5.7E+2	2.0E+2	4.6E+2	4.3E+2	6.3E+2	5.7E+2	1.7E+2
Highest 1h In/Out	0.12	0.13	0.10	0.10	0.11	0.13	0.11	0.11	0.01
Time of highest 1h Outdoor	10/29/14 0:18	10/30/14 0:00	10/30/14 9:56	10/31/14 21:51	11/2/14 1:12	11/3/14 6:00	11/3/14 20:30		
Corresponding highest 1h Indoor	10/29/14 0:58	10/30/14 0:28	10/30/14 10:24	10/31/14 23:24	11/2/14 1:31	11/3/14 8:30	11/3/14 21:25		

¹Based on 24h periods starting / ending at 6am. Day 1 starts at 10/28/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-3-E-4. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6–100 nm based on difference between concentrations measured using the TSI 3787 CPC and the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	4.1E+3	4.3E+3	1.9E+3	-7.8E+2	-1.9E+3	-1.6E+3	-3.5E+3	3.5E+2	2.9E+3
Outdoor 24 SD	2.6E+3	2.5E+3	1.5E+3	6.1E+2	1.7E+3	9.2E+2	1.5E+3	1.6E+3	6.9E+2
Indoor 24h mean	3.2E+2	2.9E+2	4.4E+1	-1.2E+2	-2.4E+2	-2.1E+2	-4.5E+2	-5.2E+1	2.6E+2
Indoor 24 SD	1.5E+2	1.4E+2	7.3E+1	4.7E+1	1.9E+2	7.6E+1	1.8E+2	1.2E+2	5.1E+1
24h mean In/Out	0.09	0.07	0.05	-0.06	0.13	0.13	0.12	0.08	0.06
Highest 8h Outdoor	7.2E+3	6.0E+3	5.2E+3	5.6E+2	-7.2E+2	-8.0E+2	-1.8E+3	2.2E+3	3.5E+3
Highest 8h Indoor	5.4E+2	4.4E+2	3.7E+2	-1.3E+1	-9.1E+1	-1.3E+2	-2.4E+2	1.2E+2	2.9E+2
Highest 8 h In/Out	0.07	0.07	0.07	-0.02	0.13	0.17	0.14	0.09	0.06
Highest 1h Outdoor	8.5E+3	9.2E+3	4.6E+3	5.4E+2	-5.3E+2	-6.4E+2	-1.3E+3	2.9E+3	4.2E+3
Highest 1h Indoor ²	5.4E+2	4.4E+2	3.7E+2	-1.3E+1	-9.1E+1	-1.3E+2	-2.4E+2	7.4E+1	2.5E+2
Highest 1h In/Out	0.04	0.06	0.02	-0.04	0.14	0.18	0.16	0.08	0.08
Time of highest 1h Outdoor	10/29/14 4:24	10/29/14 19:55	10/30/14 14:25	10/31/14 6:05	11/1/14 9:55	11/2/14 13:26	11/3/14 16:23		
Corresponding highest 1h Indoor	10/29/14 5:40	10/29/14 21:43	10/30/14 16:10	10/31/14 6:05	11/1/14 11:26	11/2/14 17:26	11/3/14 16:48		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 10/28/2014 20:30, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-3-E-5. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100–300 nm based on difference between concentrations measured using the TSI 3781 CPC with size selector and the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	3.1E+6	3.1E+6	2.0E+6	1.2E+6	1.9E+6	1.6E+6	3.5E+6	2.3E+6	8.1E+5
Outdoor 24 SD	1.3E+6	1.3E+6	1.3E+6	4.8E+5	1.7E+6	9.2E+5	1.5E+6	1.2E+6	3.7E+5
Indoor 24h mean	5.2E+5	4.2E+5	3.0E+5	1.5E+5	2.3E+5	2.0E+5	4.4E+5	3.2E+5	1.3E+5
Indoor 24 SD	2.5E+5	1.6E+5	1.6E+5	4.5E+4	1.8E+5	7.6E+4	1.8E+5	1.5E+5	6.5E+4
24h mean In/Out	0.22	0.14	0.14	0.14	0.12	0.13	0.12	0.15	0.03
Highest 8h Outdoor	4.5E+6	4.3E+6	4.4E+6	1.6E+6	3.8E+6	3.1E+6	4.8E+6	3.8E+6	1.0E+6
Highest 8h Indoor	1.0E+6	5.9E+5	5.6E+5	1.9E+5	4.5E+5	4.2E+5	6.2E+5	5.5E+5	2.3E+5
Highest 8 h In/Out	0.23	0.14	0.13	0.12	0.12	0.14	0.13	0.14	0.04
Highest 1h Outdoor	5.2E+6	4.8E+6	5.6E+6	1.9E+6	6.8E+6	3.6E+6	6.4E+6	4.9E+6	1.6E+6
Highest 1h Indoor ²	1.0E+6	5.9E+5	5.6E+5	1.9E+5	4.5E+5	4.2E+5	6.2E+5	5.6E+5	1.7E+5
Highest 1h In/Out	0.12	0.13	0.10	0.10	0.11	0.12	0.11	0.11	0.01
Time of highest 1h Outdoor	10/29/14 0:18	10/30/14 0:00	10/30/14 9:56	10/31/14 21:51	11/2/14 1:12	11/3/14 6:00	11/3/14 20:30		
Corresponding highest 1h Indoor	10/29/14 0:58	10/30/14 0:28	10/30/14 10:24	10/31/14 23:24	11/2/14 1:31	11/3/14 8:30	11/3/14 21:25		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 10/28/2014 20:30, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-3-E-6. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.3–0.4 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	3.3E+4	3.5E+4	2.6E+4	2.7E+4	1.7E+4	1.5E+4	4.1E+4	2.8E+4	8.8E+3
Outdoor 24 SD	1.4E+4	1.3E+4	1.4E+4	1.4E+4	1.6E+4	6.3E+3	1.5E+4	1.3E+4	2.8E+3
Indoor 24h mean	7.2E+3	6.0E+3	3.8E+3	1.9E+3	2.1E+3	2.1E+3	5.4E+3	4.1E+3	2.0E+3
Indoor 24 SD	3.6E+3	2.3E+3	1.9E+3	6.0E+2	1.8E+3	4.5E+2	2.5E+3	1.9E+3	1.0E+3
24h mean In/Out	0.31	0.18	0.16	0.11	0.07	0.14	0.13	0.16	0.07
Highest 8h Outdoor	4.3E+4	4.7E+4	4.5E+4	3.9E+4	3.3E+4	2.9E+4	5.4E+4	4.2E+4	7.9E+3
Highest 8h Indoor	7.8E+3	8.6E+3	8.5E+3	1.8E+3	1.7E+3	4.2E+3	7.5E+3	5.7E+3	2.9E+3
Highest 8 h In/Out	0.18	0.18	0.19	0.05	0.05	0.14	0.14	0.13	0.06
Highest 1h Outdoor	5.3E+4	6.0E+4	4.6E+4	4.6E+4	6.9E+4	2.7E+4	6.1E+4	5.2E+4	1.3E+4
Highest 1h Indoor ²	7.8E+3	8.6E+3	8.5E+3	1.8E+3	1.7E+3	4.2E+3	7.5E+3	7.1E+3	2.5E+3
Highest 1h In/Out	0.16	0.17	0.14	0.04	0.11	0.21	0.16	0.14	0.05
Time of highest 1h Outdoor	10/29/14 0:19	10/30/14 0:18	10/30/14 10:09	10/31/14 22:00	11/2/14 1:36	11/3/14 6:00	11/3/14 19:58		
Corresponding highest 1h Indoor	10/29/14 0:58	10/30/14 0:34	10/30/14 10:09	10/31/14 23:18	11/2/14 2:18	11/3/14 8:27	11/3/14 20:44		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 10/28/2014 20:30, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-3-E-7. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.4–0.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	6.3E+3	6.4E+3	7.1E+3	4.4E+3	2.4E+3	2.2E+3	7.4E+3	5.2E+3	2.0E+3
Outdoor 24 SD	3.2E+3	3.0E+3	7.2E+3	2.6E+3	2.3E+3	1.1E+3	3.7E+3	3.3E+3	1.8E+3
Indoor 24h mean	1.3E+3	9.6E+2	5.6E+2	2.5E+2	2.8E+2	3.1E+2	8.8E+2	6.5E+2	3.7E+2
Indoor 24 SD	6.9E+2	4.2E+2	3.2E+2	6.8E+1	2.2E+2	7.6E+1	4.9E+2	3.3E+2	2.1E+2
24h mean In/Out	0.32	0.16	0.11	0.08	0.07	0.13	0.12	0.14	0.08
Highest 8h Outdoor	9.0E+3	9.5E+3	1.5E+4	7.0E+3	6.0E+3	4.2E+3	1.0E+4	8.7E+3	3.2E+3
Highest 8h Indoor	1.4E+3	1.4E+3	7.0E+2	2.7E+2	2.5E+2	5.3E+2	1.4E+3	8.5E+2	4.9E+2
Highest 8 h In/Out	0.15	0.15	0.05	0.04	0.04	0.13	0.13	0.10	0.05
Highest 1h Outdoor	1.2E+4	1.4E+4	2.5E+4	9.5E+3	1.0E+4	4.6E+3	1.7E+4	1.3E+4	6.1E+3
Highest 1h Indoor ²	1.4E+3	1.4E+3	7.0E+2	2.7E+2	2.5E+2	5.3E+2	1.4E+3	1.2E+3	5.9E+2
Highest 1h In/Out	0.14	0.13	0.03	0.03	0.09	0.21	0.13	0.11	0.06
Time of highest 1h Outdoor	10/28/14 19:56	10/30/14 0:06	10/30/14 13:52	11/1/14 3:36	11/2/14 1:36	11/3/14 6:00	11/3/14 19:23		
Corresponding highest 1h Indoor	10/28/14 21:20	10/30/14 0:33	10/30/14 13:52	11/1/14 3:47	11/2/14 2:11	11/3/14 8:25	11/3/14 20:28		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 10/28/2014 20:30, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-3-E-8. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.5–0.7 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	4.1E+3	4.0E+3	4.7E+3	2.0E+3	1.4E+3	1.2E+3	4.4E+3	3.1E+3	1.4E+3
Outdoor 24 SD	2.4E+3	2.2E+3	4.8E+3	1.0E+3	9.8E+2	6.5E+2	2.9E+3	2.1E+3	1.3E+3
Indoor 24h mean	7.8E+2	5.3E+2	3.0E+2	1.4E+2	1.5E+2	1.6E+2	4.9E+2	3.7E+2	2.3E+2
Indoor 24 SD	4.3E+2	2.7E+2	1.7E+2	3.4E+1	9.0E+1	4.6E+1	3.2E+2	1.9E+2	1.4E+2
24h mean In/Out	0.34	0.15	0.10	0.08	0.08	0.13	0.11	0.14	0.08
Highest 8h Outdoor	6.1E+3	6.3E+3	1.0E+4	3.0E+3	2.6E+3	2.1E+3	6.9E+3	5.3E+3	2.7E+3
Highest 8h Indoor	8.1E+2	8.4E+2	3.6E+2	1.4E+2	1.4E+2	2.5E+2	8.0E+2	4.8E+2	3.0E+2
Highest 8 h In/Out	0.13	0.13	0.04	0.05	0.05	0.12	0.12	0.09	0.04
Highest 1h Outdoor	9.3E+3	9.8E+3	1.7E+4	3.9E+3	4.4E+3	2.7E+3	1.2E+4	8.5E+3	4.8E+3
Highest 1h Indoor ²	8.1E+2	8.4E+2	3.6E+2	1.4E+2	1.4E+2	2.5E+2	8.0E+2	7.1E+2	4.2E+2
Highest 1h In/Out	0.11	0.11	0.02	0.04	0.09	0.18	0.11	0.10	0.05
Time of highest 1h Outdoor	10/28/14 19:56	10/30/14 0:05	10/30/14 13:41	11/1/14 2:16	11/2/14 1:13	11/3/14 6:00	11/3/14 19:59		
Corresponding highest 1h Indoor	10/28/14 21:00	10/30/14 0:33	10/30/14 13:41	11/1/14 2:35	11/2/14 1:55	11/3/14 8:26	11/3/14 20:29		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 10/28/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-3-E-9. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.7–1.0 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.1E+3	9.0E+2	7.9E+2	4.5E+2	3.7E+2	2.4E+2	8.4E+2	6.7E+2	2.9E+2
Outdoor 24 SD	6.2E+2	5.3E+2	4.9E+2	1.5E+2	1.7E+2	1.3E+2	6.3E+2	3.9E+2	2.1E+2
Indoor 24h mean	1.2E+2	1.0E+2	5.9E+1	3.5E+1	3.3E+1	2.8E+1	8.3E+1	6.6E+1	3.4E+1
Indoor 24 SD	5.2E+1	5.4E+1	3.2E+1	9.5E+0	1.3E+1	8.7E+0	5.8E+1	3.3E+1	2.1E+1
24h mean In/Out	0.12	0.11	0.09	0.08	0.08	0.11	0.10	0.10	0.01
Highest 8h Outdoor	1.4E+3	1.5E+3	1.4E+3	5.8E+2	5.4E+2	4.3E+2	1.4E+3	1.0E+3	4.4E+2
Highest 8h Indoor	1.6E+2	1.6E+2	1.6E+2	4.2E+1	4.7E+1	4.4E+1	1.4E+2	1.1E+2	5.4E+1
Highest 8 h In/Out	0.11	0.11	0.12	0.07	0.09	0.10	0.10	0.10	0.01
Highest 1h Outdoor	2.3E+3	2.3E+3	1.8E+3	7.7E+2	8.6E+2	5.2E+2	2.6E+3	1.6E+3	8.0E+2
Highest 1h Indoor ²	1.6E+2	1.6E+2	1.6E+2	4.2E+1	4.7E+1	4.4E+1	1.4E+2	1.4E+2	8.0E+1
Highest 1h In/Out	0.09	0.09	0.05	0.07	0.08	0.16	0.10	0.09	0.03
Time of highest 1h Outdoor	10/28/14 19:54	10/30/14 0:05	10/30/14 18:16	10/31/14 12:58	11/2/14 1:01	11/3/14 5:49	11/3/14 19:58		
Corresponding highest 1h Indoor	10/28/14 20:44	10/30/14 0:27	10/30/14 19:18	10/31/14 15:20	11/2/14 1:41	11/3/14 8:26	11/3/14 20:30		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 10/28/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-3-E-10. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor/outdoor ratios for particles with aerodynamic diameters 1.0–2.5 microns measured with the MetOne BT637S OPC

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	7.3E+2	6.1E+2	4.8E+2	2.9E+2	2.4E+2	1.4E+2	4.1E+2	4.2E+2	1.9E+2
Outdoor 24 SD	2.8E+2	2.8E+2	2.8E+2	1.4E+2	9.9E+1	6.1E+1	2.6E+2	2.0E+2	9.0E+1
Indoor 24h mean	5.8E+1	4.8E+1	3.0E+1	1.9E+1	1.6E+1	1.2E+1	3.1E+1	3.1E+1	1.6E+1
Indoor 24 SD	2.3E+1	2.4E+1	1.7E+1	6.3E+0	5.7E+0	4.1E+0	1.9E+1	1.4E+1	7.9E+0
24h mean In/Out	0.08	0.08	0.07	0.06	0.07	0.08	0.07	0.07	0.01
Highest 8h Outdoor	9.2E+2	9.1E+2	8.0E+2	4.5E+2	3.3E+2	2.3E+2	6.1E+2	6.1E+2	2.6E+2
Highest 8h Indoor	7.2E+1	7.3E+1	6.9E+1	2.4E+1	2.1E+1	1.8E+1	4.8E+1	4.6E+1	2.3E+1
Highest 8 h In/Out	0.08	0.08	0.09	0.05	0.06	0.08	0.08	0.07	0.01
Highest 1h Outdoor	1.1E+3	1.3E+3	1.0E+3	5.9E+2	4.2E+2	2.8E+2	1.1E+3	8.3E+2	3.6E+2
Highest 1h Indoor ²	7.2E+1	7.3E+1	6.9E+1	2.4E+1	2.1E+1	1.8E+1	4.8E+1	5.8E+1	2.6E+1
Highest 1h In/Out	0.07	0.07	0.06	0.05	0.06	0.12	0.08	0.07	0.02
Time of highest 1h Outdoor	10/28/14 19:47	10/29/14 23:59	10/30/14 9:49	10/31/14 14:47	11/2/14 1:00	11/3/14 5:49	11/3/14 19:20		
Corresponding highest 1h Indoor	10/28/14 20:36	10/30/14 0:32	10/30/14 10:18	10/31/14 15:32	11/2/14 1:32	11/3/14 8:17	11/3/14 20:25		

¹Based on 24h periods starting / ending at 6am. Day 1 starts at 10/28/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-3-E-11. Summary statistics for estimated PM_{2.5} concentrations (µg m⁻³) calculated from particle number concentrations resolved by size from 6 nm to 2.5 microns (as reported in Tables FW-3-E-2 to FW-3-E-9) and resulting indoor/outdoor ratios.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	2.2E+1	2.0E+1	1.4E+1	8.8E+0	1.0E+1	8.1E+0	2.0E+1	1.5E+1	5.5E+0
Outdoor 24 SD	8.1E+0	8.4E+0	8.6E+0	3.1E+0	7.7E+0	4.2E+0	8.4E+0	6.9E+0	2.1E+0
Indoor 24h mean	2.7E+0	2.5E+0	1.7E+0	8.5E-1	1.1E+0	1.0E+0	2.3E+0	1.7E+0	7.1E-1
Indoor 24 SD	1.0E+0	1.0E+0	8.9E-1	2.3E-1	8.3E-1	3.3E-1	9.9E-1	7.6E-1	3.1E-1
24h mean In/Out	0.12	0.12	0.12	0.11	0.10	0.13	0.12	0.12	0.01
Highest 8h Outdoor	2.8E+1	2.8E+1	2.7E+1	1.2E+1	1.9E+1	1.5E+1	2.7E+1	2.2E+1	6.4E+0
Highest 8h Indoor	3.4E+0	3.6E+0	3.6E+0	1.1E+0	2.1E+0	2.0E+0	3.3E+0	2.7E+0	9.2E-1
Highest 8 h In/Out	0.12	0.13	0.13	0.09	0.11	0.13	0.12	0.12	0.01
Highest 1h Outdoor	3.2E+1	3.5E+1	3.3E+1	1.3E+1	3.3E+1	1.8E+1	3.9E+1	2.9E+1	8.8E+0
Highest 1h Indoor ²	3.4E+0	3.6E+0	3.6E+0	1.1E+0	2.1E+0	2.0E+0	3.3E+0	3.2E+0	9.6E-1
Highest 1h In/Out	0.11	0.12	0.10	0.09	0.10	0.14	0.11	0.11	0.01
Time of highest 1h Outdoor	10/29/14 0:18	10/30/14 0:00	10/30/14 9:56	10/31/14 12:50	11/2/14 1:13	11/3/14 6:00	11/3/14 20:02		
Corresponding highest 1h Indoor	10/29/14 0:54	10/30/14 0:32	10/30/14 10:21	10/31/14 15:04	11/2/14 1:54	11/3/14 8:29	11/3/14 20:46		

¹Based on 24h periods starting / ending at 6am. Day 1 starts at 10/28/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-3-E-12. Summary statistics for concentrations of PM_{2.5} ($\mu\text{g m}^{-3}$) and indoor /outdoor ratios from measurements reported by TSI DustTrak II.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	2.4E-2	2.5E-2	2.0E-2	1.3E-2	1.1E-2	9.6E-3	2.9E-2	1.9E-2	6.9E-3
Outdoor 24 SD	1.0E-2	1.0E-2	1.3E-2	6.0E-3	9.6E-3	3.8E-3	1.3E-2	9.3E-3	3.1E-3
Indoor 24h mean	4.4E-3	3.2E-3	2.2E-3	1.1E-3	1.6E-3	1.4E-3	3.3E-3	2.5E-3	1.1E-3
Indoor 24 SD	3.0E-3	2.1E-3	1.1E-3	4.2E-4	1.4E-3	3.6E-4	1.9E-3	1.5E-3	8.8E-4
24h mean In/Out	0.29	0.14	0.12	0.11	0.10	0.15	0.12	0.15	0.06
Highest 8h Outdoor	3.2E-2	3.6E-2	3.5E-2	1.8E-2	2.0E-2	1.9E-2	4.0E-2	2.8E-2	8.6E-3
Highest 8h Indoor	4.4E-3	5.1E-3	5.1E-3	1.1E-3	2.7E-3	2.7E-3	4.9E-3	3.7E-3	1.4E-3
Highest 8 h In/Out	0.14	0.14	0.15	0.06	0.14	0.14	0.12	0.13	0.03
Highest 1h Outdoor	3.9E-2	4.9E-2	4.0E-2	2.2E-2	4.5E-2	1.8E-2	5.3E-2	3.8E-2	1.3E-2
Highest 1h Indoor ²	4.4E-3	5.1E-3	5.1E-3	1.1E-3	2.7E-3	2.7E-3	4.9E-3	4.7E-3	2.2E-3
Highest 1h In/Out	0.18	0.18	0.06	0.09	0.09	0.19	0.10	0.13	0.05
Time of highest 1h Outdoor	10/29/14 0:18	10/30/14 0:17	10/30/14 13:50	10/31/14 22:04	11/2/14 1:27	11/3/14 6:00	11/3/14 19:24		
Corresponding highest 1h Indoor	10/29/14 0:44	10/30/14 0:44	10/30/14 13:50	11/1/14 0:02	11/2/14 2:01	11/3/14 8:32	11/3/14 20:35		

¹Based on 24h periods starting / ending at 6am. Day 1 starts at 10/28/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-3-E-13. Daily¹ summary statistics for concentrations (nanograms m^{-3}) and indoor /outdoor ratios of aerosol black carbon measured using the Aethalometer AE22.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.4E+3	1.7E+3	1.0E+3	5.1E+2	4.0E+2	3.5E+2	1.3E+3	9.6E+2	5.0E+2
Outdoor 24 SD	9.3E+2	1.0E+3	1.2E+3	2.9E+2	6.2E+2	4.4E+2	7.9E+2	7.6E+2	3.1E+2
Indoor 24h mean	3.6E+2	2.8E+2	1.7E+2	2.3E+1	9.1E+1	1.1E+2	2.5E+2	1.8E+2	1.1E+2
Indoor 24 SD	2.5E+2	1.6E+2	2.0E+2	9.3E+1	1.1E+2	1.4E+2	1.3E+2	1.5E+2	4.8E+1
24h mean In/Out	0.40	0.19	0.17	0.15	0.16	0.30	0.22	0.22	0.09
Highest 8h Outdoor	2.8E+3	2.7E+3	3.1E+3	8.3E+2	9.0E+2	7.5E+2	1.7E+3	1.8E+3	9.6E+2
Highest 8h Indoor	9.0E+2	4.4E+2	4.4E+2	8.8E+1	1.9E+2	1.8E+2	3.3E+2	3.7E+2	2.5E+2
Highest 8 h In/Out	0.32	0.16	0.14	0.11	0.21	0.24	0.20	0.20	0.06
Highest 1h Outdoor	3.0E+3	3.3E+3	4.3E+3	1.2E+3	2.3E+3	1.6E+3	3.2E+3	2.7E+3	1.0E+3
Highest 1h Indoor ²	9.0E+2	4.4E+2	4.4E+2	8.8E+1	1.9E+2	1.8E+2	3.3E+2	4.2E+2	1.5E+2
Highest 1h In/Out	0.14	0.16	0.12	0.09	0.17	0.22	0.18	0.16	0.04
Time of highest 1h Outdoor	10/29/14 0:09	10/29/14 21:51	10/30/14 10:00	10/31/14 9:21	11/2/14 1:39	11/3/14 5:45	11/3/14 20:00		
Corresponding highest 1h Indoor	10/29/14 2:00	10/29/14 23:21	10/30/14 10:33	10/31/14 9:27	11/2/14 2:24	11/3/14 8:15	11/3/14 21:24		

¹Based on 24h periods starting / ending at 6am. Day 1 starts at 10/28/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Appendix FW-4-F. Results for System F, November 4-10, 2014.

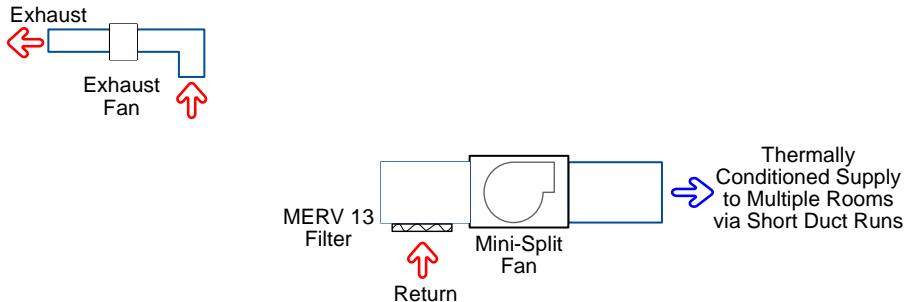


Table FW-4-F-1. Description of **System F** component characteristics during the period of **Nov 4-10, 2014**.

System Parameter	Description or Measured Value
Heating	20,000 BTU/h, Heat Pump HSPF 10.6
Cooling	1.5 ton, SEER17.5 air conditioner, variable capacity
Thermal distribution	Central fan with ECM motor: 500-600 cfm
Ventilation	Exhaust fan in main bathroom with ECM; Set to 38 cfm continuous
Filtration	MERV13, 1" (FiltersFast FFM1361) filter installed at the Mini-Split return air plenum. Some particle removal as air infiltrates through building envelope to replace air exiting home through continuous exhaust fan in bathroom.
Recirculation blower schedule	Always on, on the lower speed when no call for conditioning.
VOC removal system	None

Notes about this monitoring period

We lost tracer gas injection system midway through the operational period. We lost a CPC 3787 near the end of the operational period. The CPC 3787 indoor / outdoor data stream was constructed using both instruments until the problem occurred and the remaining instrument afterward. All of the other instruments were functioning normally.

The 24 h running statistics in the figures starts at 11/4/2014 21:45.

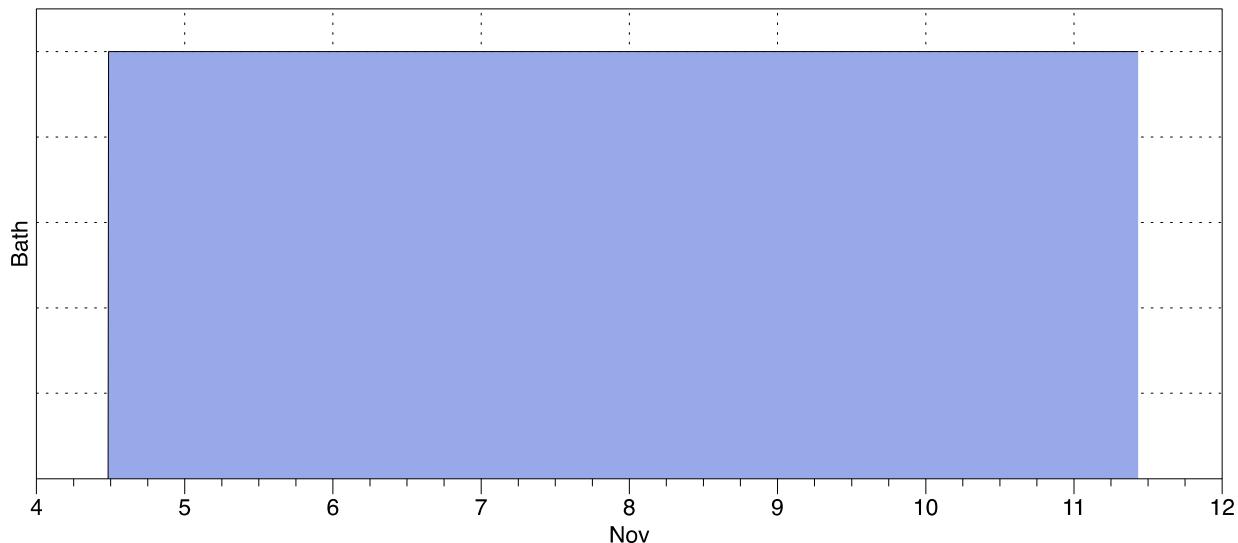


Figure FW-4-F-1. Operation of mechanical systems: Bath exhaust fan.

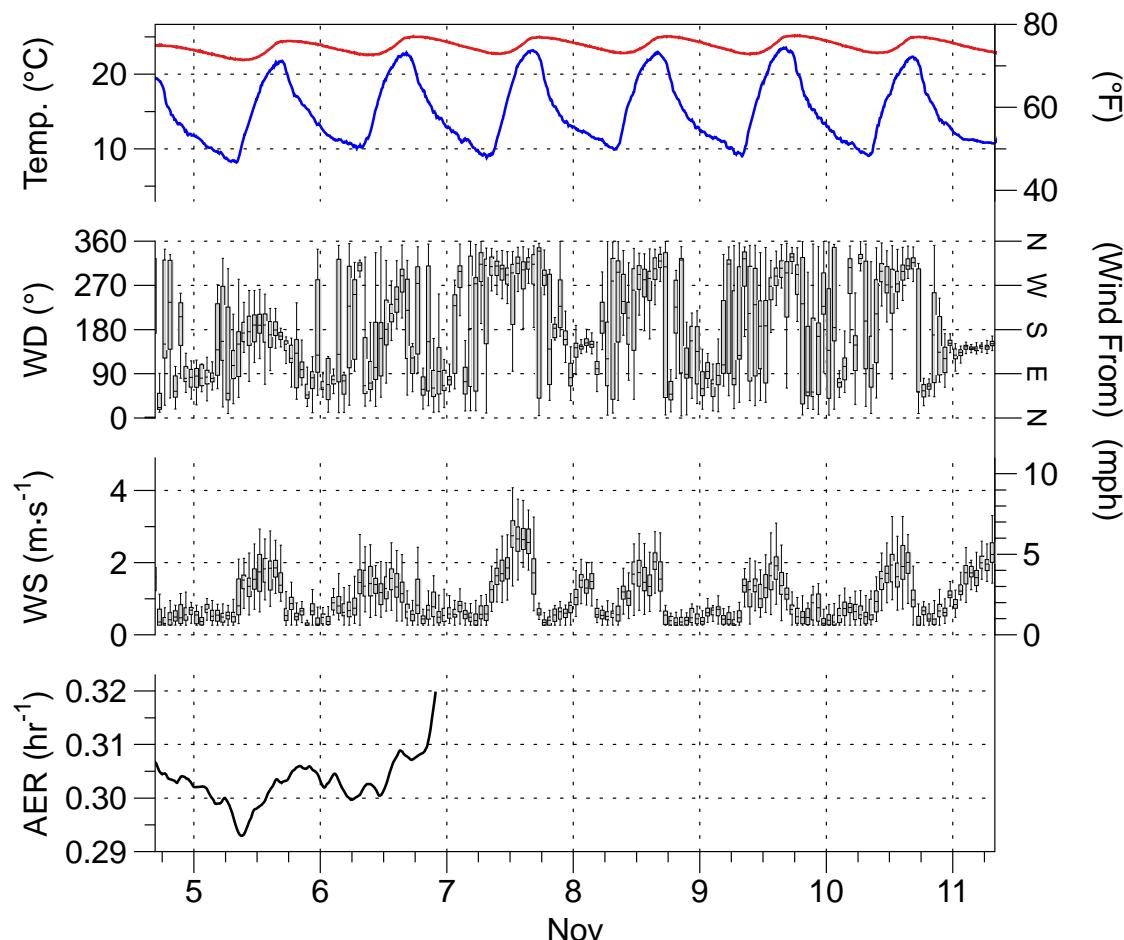


Figure FW-4-F-2. Environmental parameters measured during operation of System F, Nov 4-10, 2014. From top to bottom: indoor (red) and outdoor (blue) temperatures, wind direction (WD) in units of degrees from North, wind speed (WS), and air exchange rate (AER). For WD and WS, the box for each hour shows the 25th, 50th and 75th percentiles of the measured values and whiskers extend 1.5X the interquartile range (75th-25th percentile values) above the 75th and below the 25th percentile values.

Guide to plots of pollutant concentration time series and indoor / outdoor (I/O) ratios

The bottom section of each plot shows outdoor and indoor time series using the resolution of data collection: 3-min for black carbon and 1-min for all other parameters. The top and bottom of grey band are LOESS-smoothed, 1-min (or 3-min for black carbon) time-series. Also shown are time series with 1h and 24h time averaging for most pollutants. Triangles in bottom of plot indicate the highest 1h outdoor and corresponding highest 1h indoor average during each day. The top section of each plot shows the ratio of indoor to outdoor running 24h mean values (8h for ozone) and the ratios of highest 1h indoor to corresponding highest 1h outdoor concentration each day.

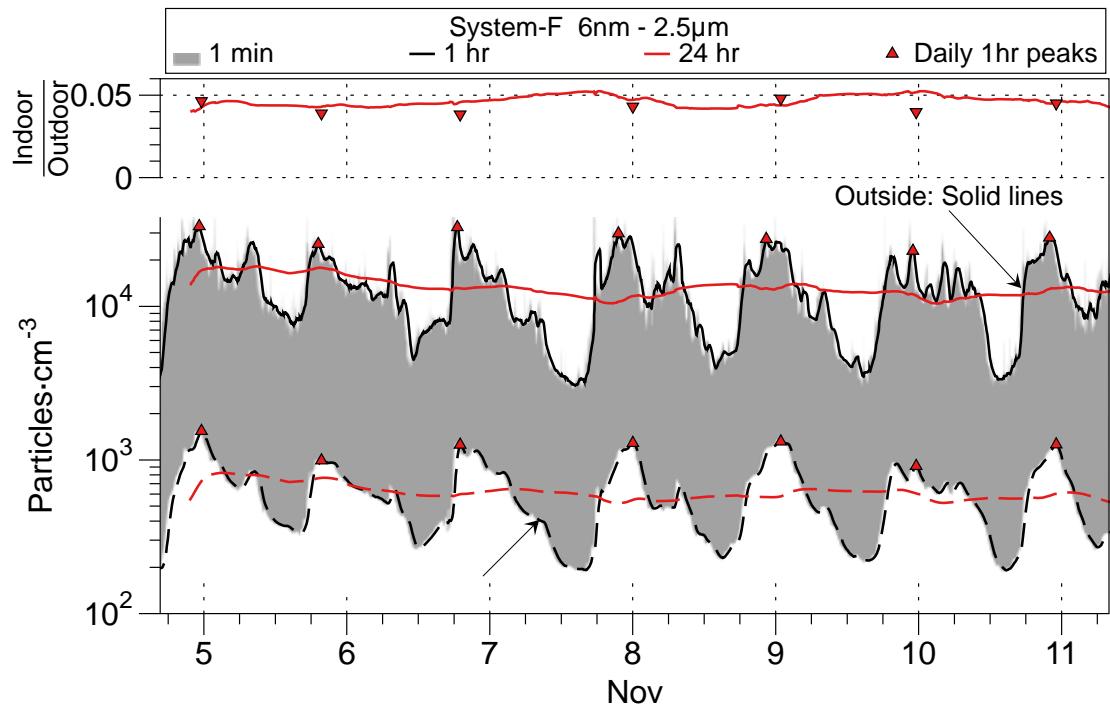


Figure FW-4-F-3. Number concentrations of 6 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of System F, Nov 4-10, 2014. Data collected using TSI 3787 CPCs.

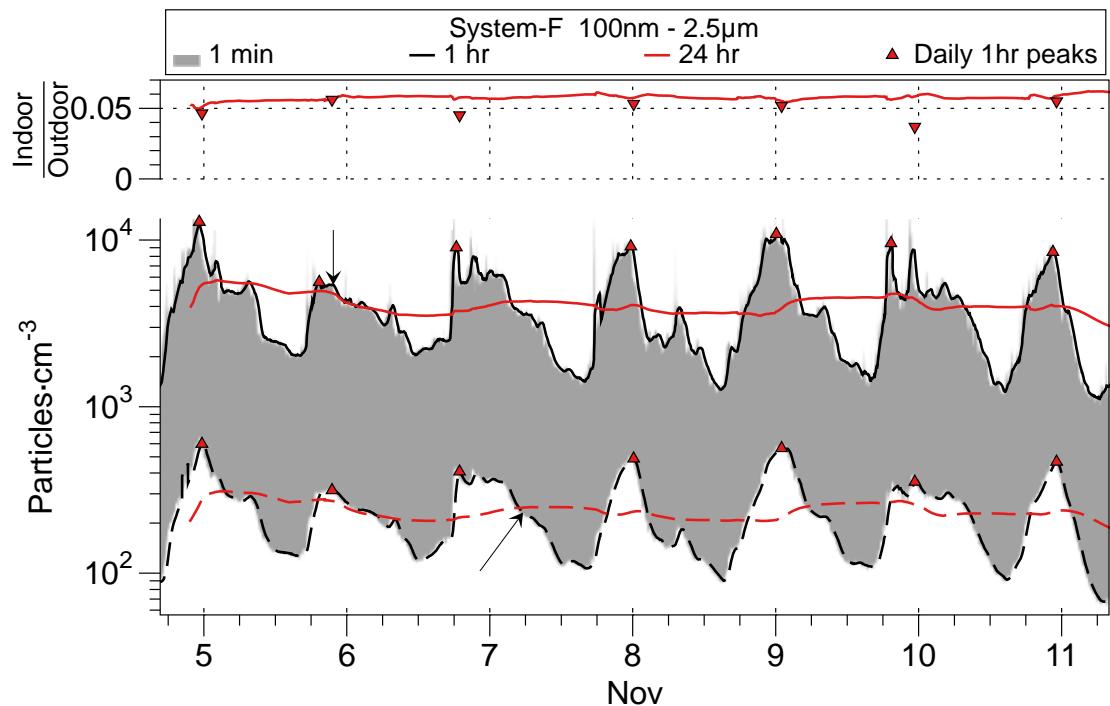


Figure FW-4-F-4. Number concentrations of 100 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of System F, Nov 4-10, 2014. Data collected using TSI 3781 CPCs outfitted with screens to exclude particles smaller than 100 nm. Refer to “Guide” before Figure FW-4-F-3.

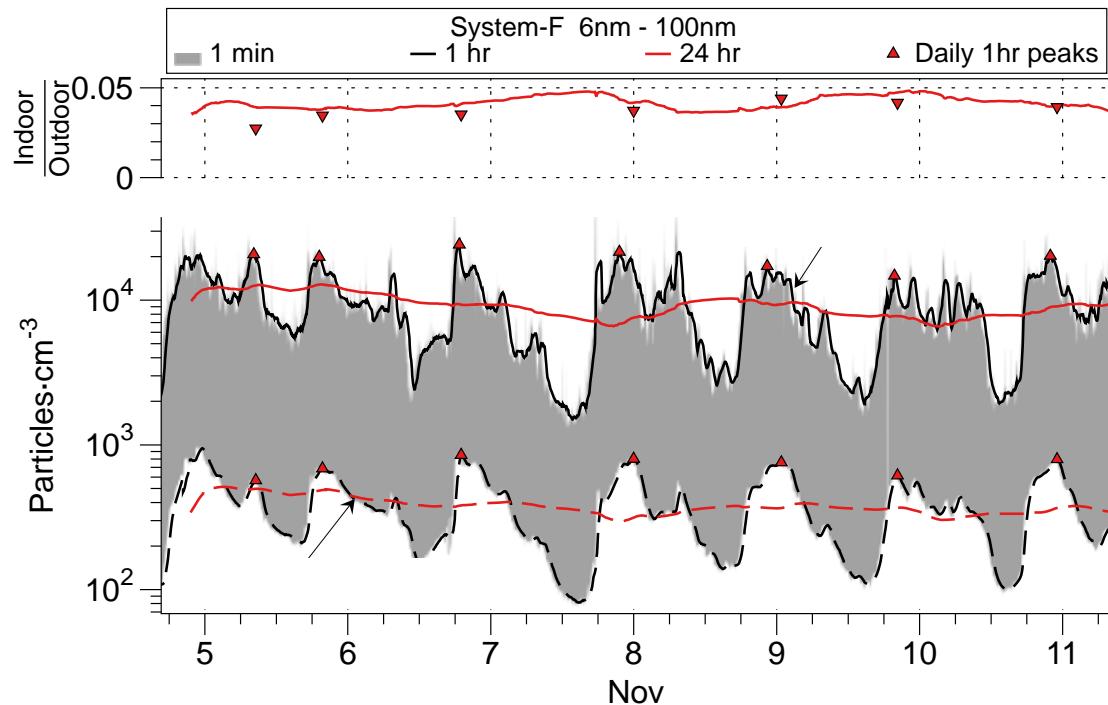


Figure FW-4-F-5. Number concentrations of 6–100 nm diameter particles measured outdoors and indoors during operation of System F, Nov 4–10, 2014. Data obtained as the difference between time series shown in prior two figures. Refer to “Guide” before Figure FW-4-F-3.

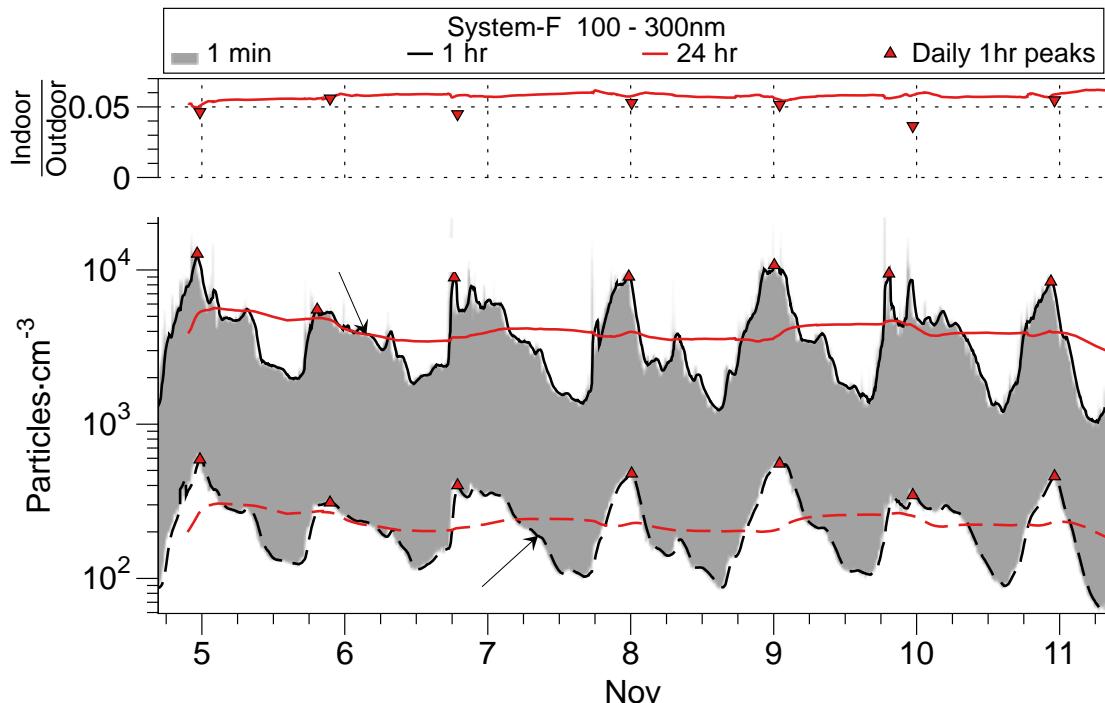


Figure FW-4-F-6. Number concentrations of 100–300 nm diameter particles measured outdoors and indoors during operation of System F, Nov 4–10, 2014. Data obtained as the difference between the TSI 3781 CPC with size selector and the MetOne BT637S OPC. Refer to “Guide” before Figure FW-4-F-3

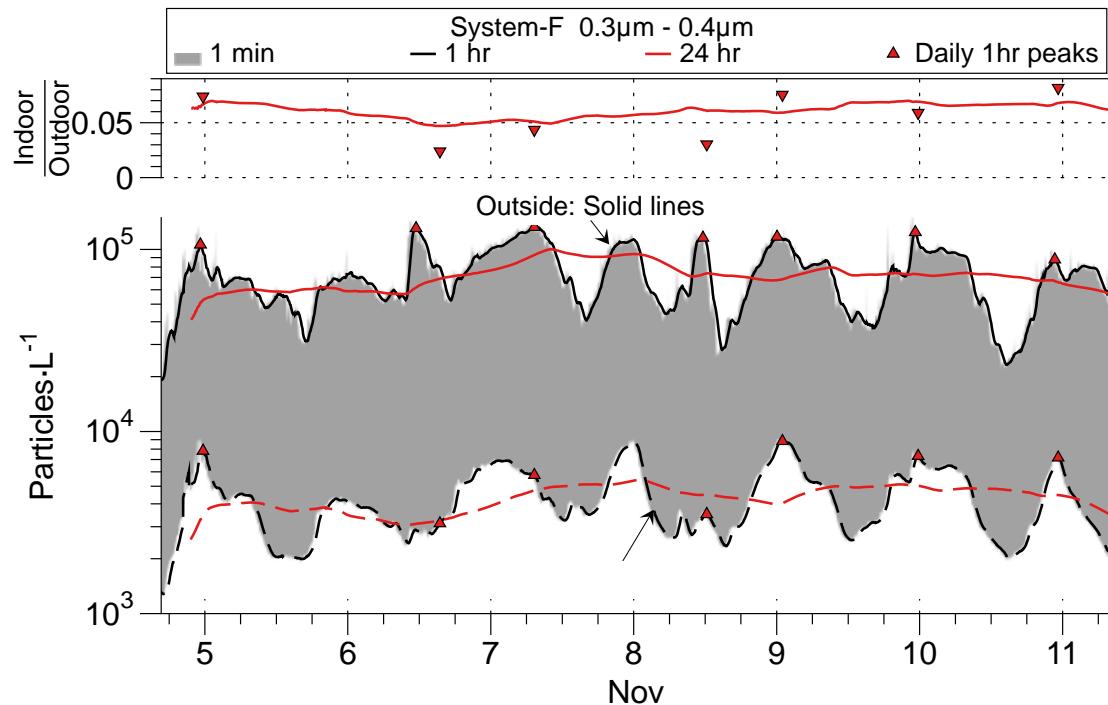


Figure FW-4-F-7. Number concentrations of 0.3–0.4 μm diameter particles measured outdoors and indoors during operation of System F, Nov 4-10, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-4-F-3.

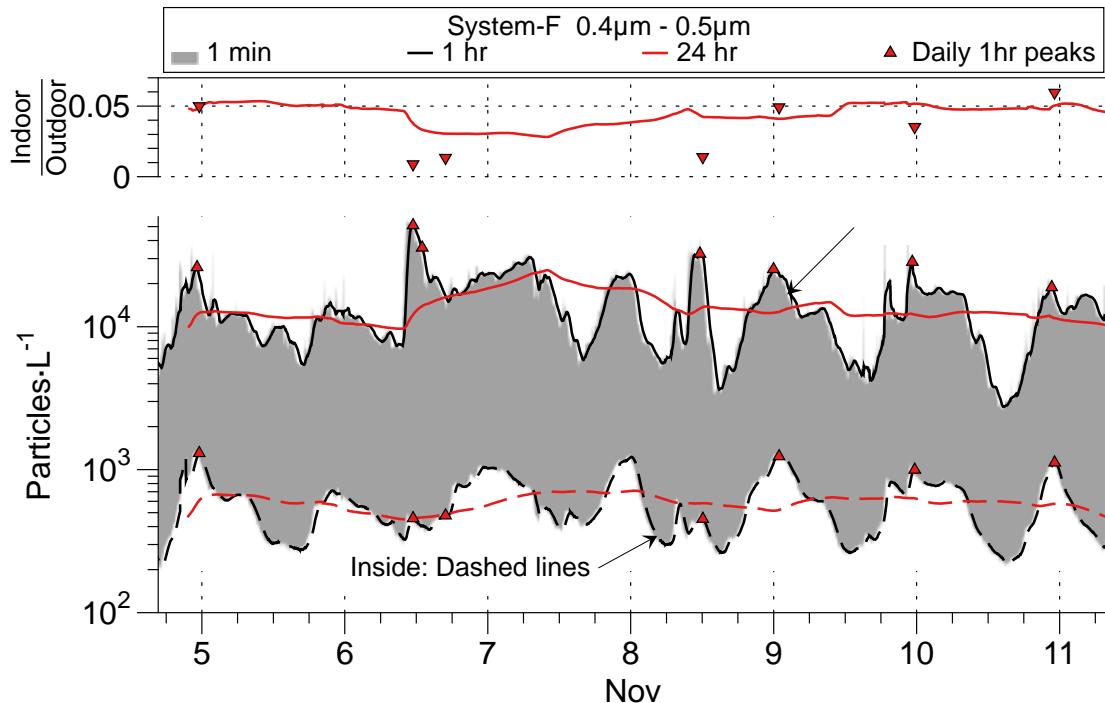


Figure FW-4-F-8. Number concentrations of 0.4–0.5 μm diameter particles measured outdoors and indoors during operation of System F, Nov 4-10, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-4-F-3.

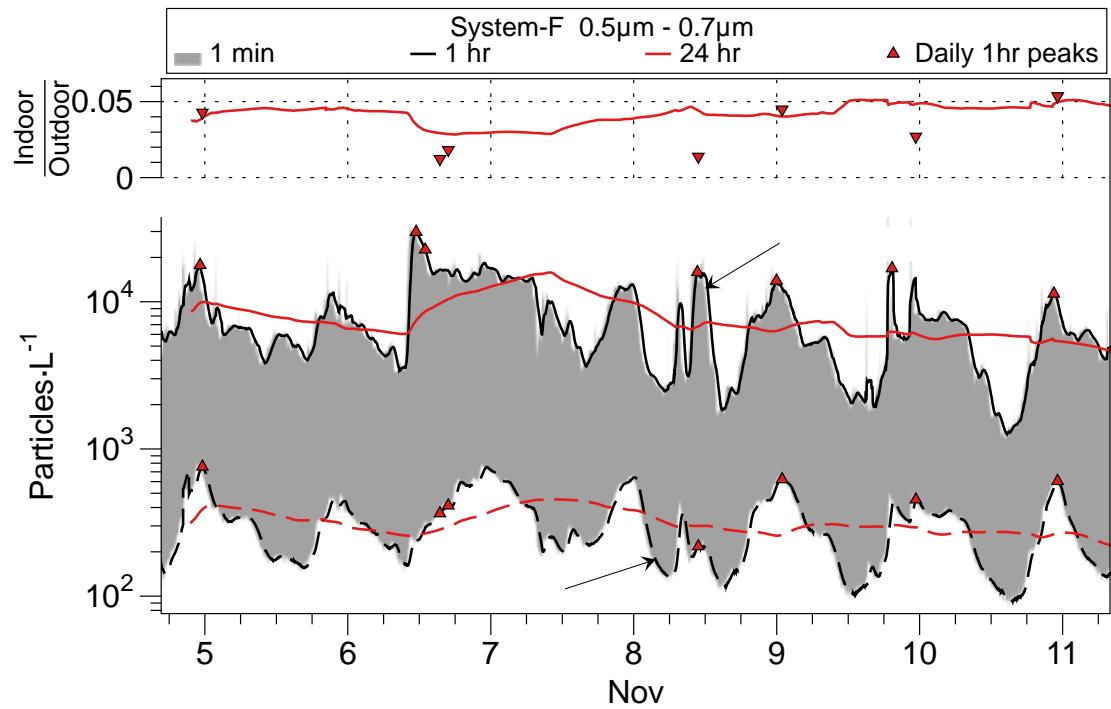


Figure FW-4-F-9. Number concentrations of 0.5–0.7 μm diameter particles measured outdoors and indoors during operation of System F, Nov 4–10, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-4-F-3.

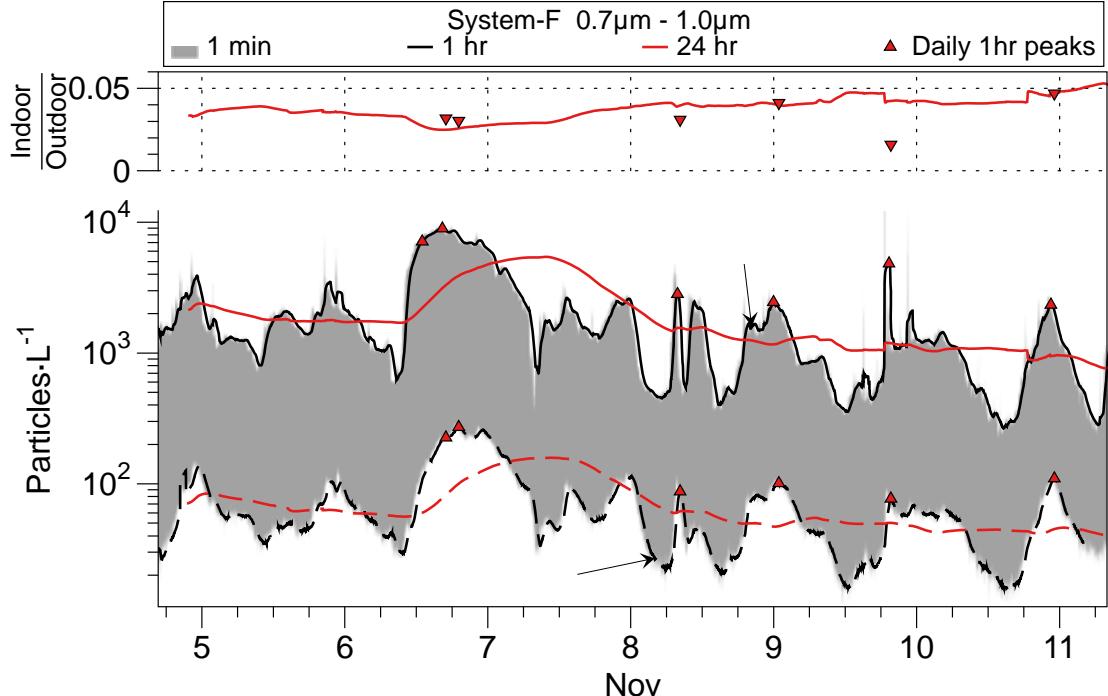


Figure FW-4-F-10. Number concentrations of 0.7–1.0 μm diameter particles measured outdoors and indoors during operation of System F, Nov 4–10, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-4-F-3.

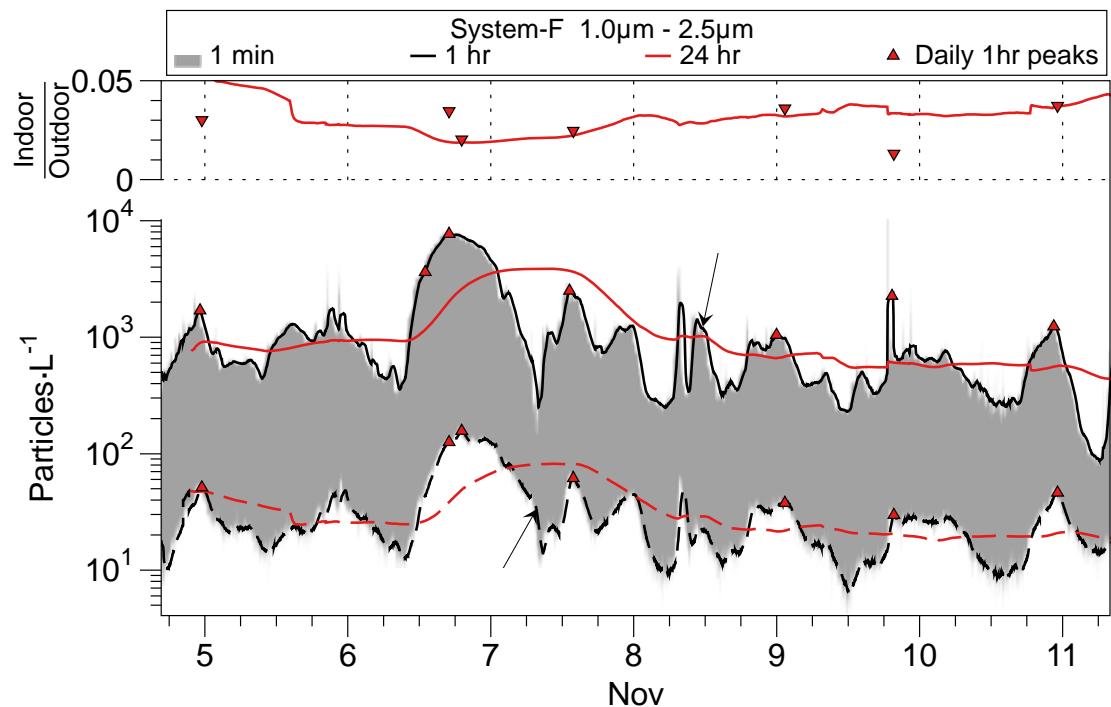


Figure FW-4-F-11. Number concentrations of 1.0–2.5 μm diameter particles measured outdoors and indoors during operation of System F, Nov 4–10, 2014. Data collected using MetOne BT637S particle counters. Refer to Figure FW-4-F-3 for details.

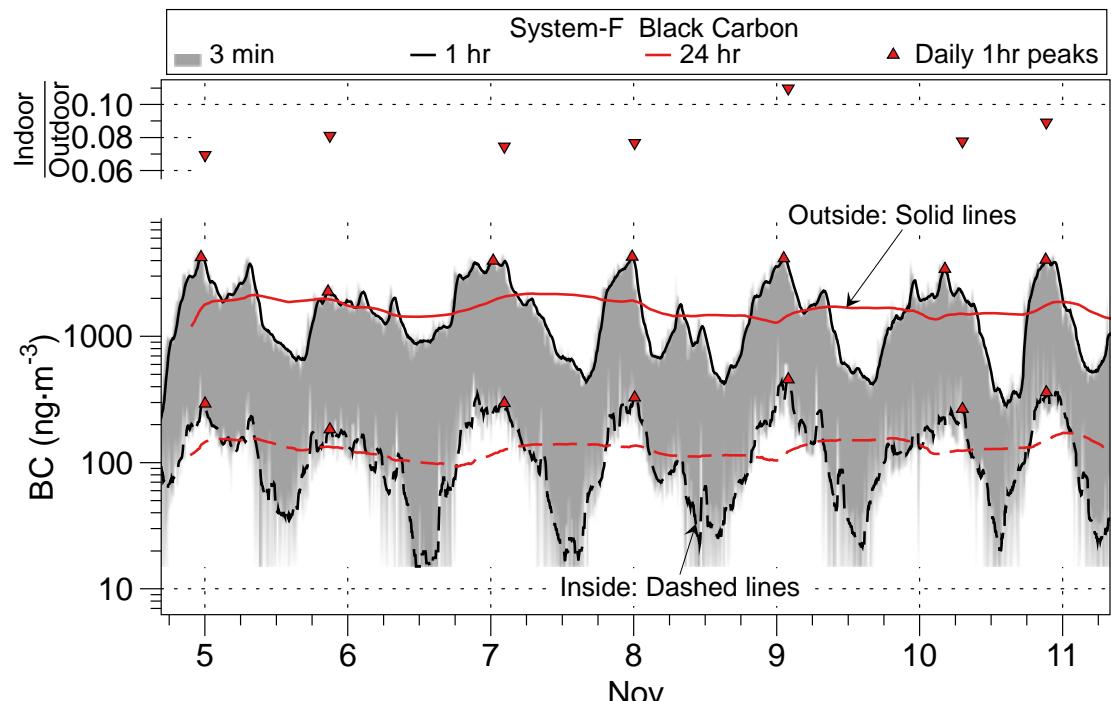


Figure FW-4-F-12. Black carbon concentrations measured outdoors and indoors during operation of System F, Nov 4–10, 2014. Data collected using AE22 Aethalometers with 3-min samples. Data otherwise as described in Figure FW-4-F-3 caption.

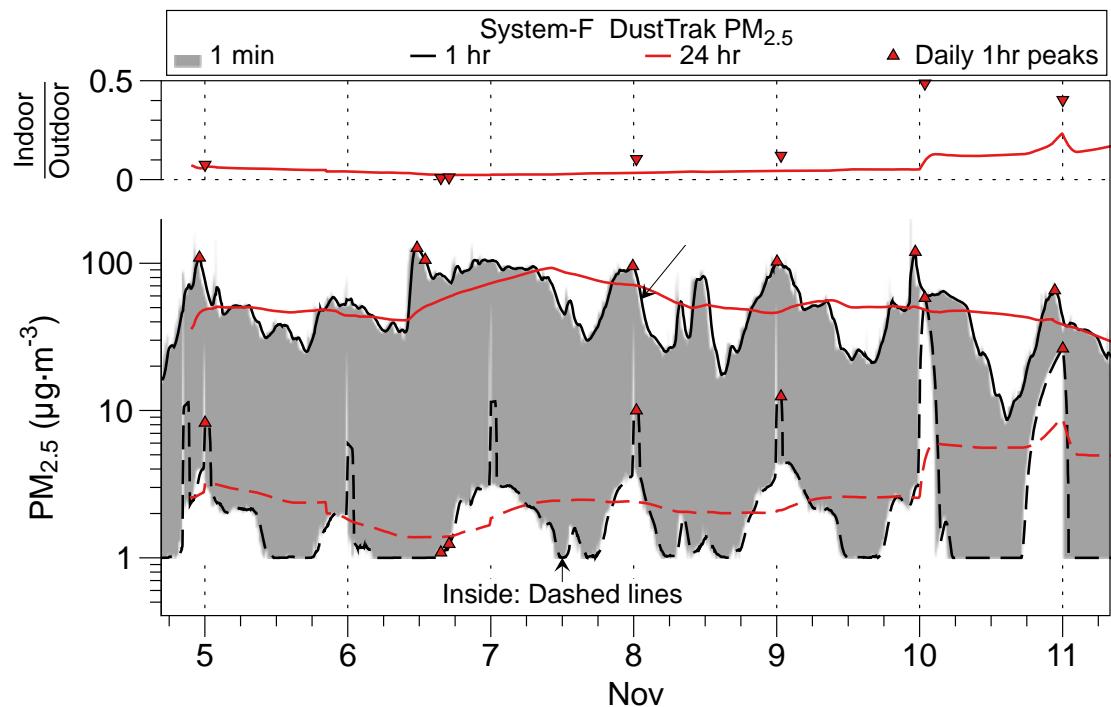


Figure FW-4-F-13. PM_{2.5} reported by TSI DustTrak II 8530 measurements outdoors and indoors during operation of System F, Nov 4-10, 2014. The DustTrak measures light scattering and uses a calibration to estimate PM_{2.5} mass. Refer to “Guide” before Figure FW-4-F-3.

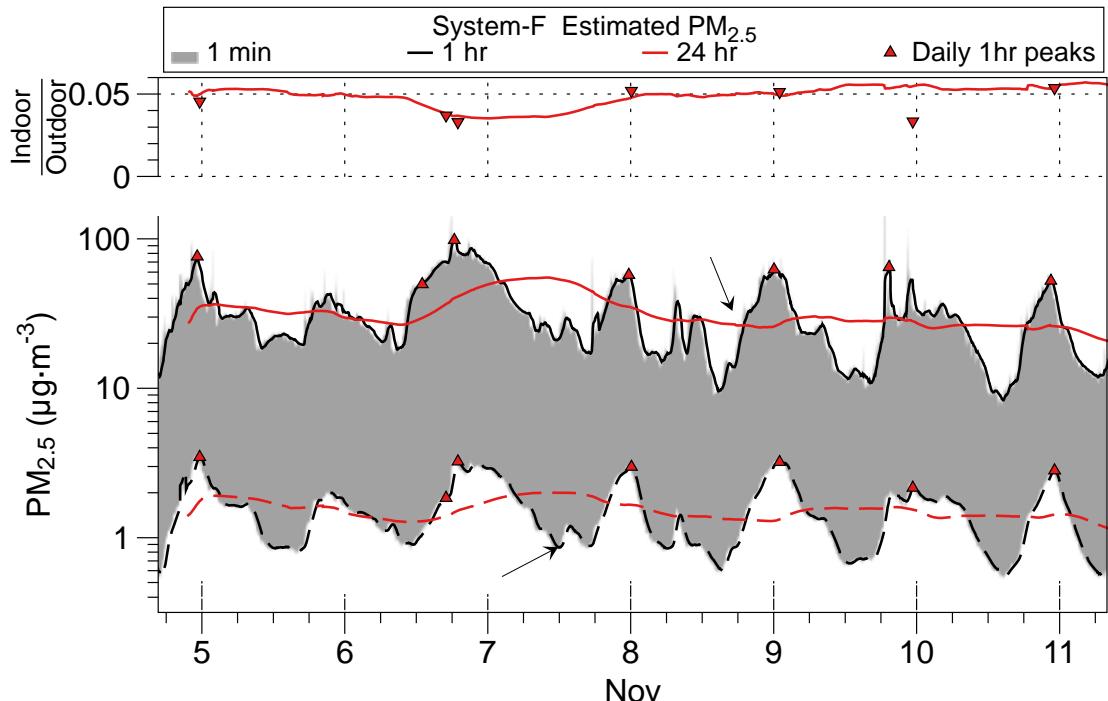


Figure FW-4-F-14. Estimated PM_{2.5} concentration calculated from size-resolved particle number concentrations measured by MetOne and CPC during operation of System F, Nov 4-10, 2014. Details provided in body of report. Refer to “Guide” before Figure FW-4-F-3.

Table FW-4-F-2. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6 nm to 2.5 micron measured using the TSI 3787 CPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.7E+4	1.3E+4	1.2E+4	1.4E+4	1.2E+4	1.2E+4	1.4E+4	1.3E+4	1.6E+3
Outdoor 24 SD	8.3E+3	5.7E+3	7.8E+3	9.9E+3	7.8E+3	6.1E+3	7.3E+3	7.6E+3	1.3E+3
Indoor 24h mean	7.4E+2	5.9E+2	6.1E+2	5.8E+2	6.2E+2	5.6E+2	5.6E+2	6.1E+2	5.7E+1
Indoor 24 SD	3.6E+2	2.2E+2	3.2E+2	3.2E+2	3.6E+2	2.3E+2	3.4E+2	3.1E+2	5.5E+1
24h mean In/Out	0.05	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.00
Highest 8h Outdoor	2.4E+4	1.9E+4	2.1E+4	2.2E+4	2.2E+4	1.6E+4	2.0E+4	2.0E+4	2.4E+3
Highest 8h Indoor	1.1E+3	8.4E+2	1.0E+3	9.5E+2	1.1E+3	7.9E+2	9.3E+2	9.6E+2	1.1E+2
Highest 8 h In/Out	0.05	0.05	0.05	0.04	0.05	0.05	0.05	0.05	0.00
Highest 1h Outdoor	3.3E+4	2.5E+4	3.3E+4	3.0E+4	2.7E+4	2.3E+4	2.8E+4	2.9E+4	3.5E+3
Highest 1 h Indoor ²	1.1E+3	8.4E+2	1.0E+3	9.5E+2	1.1E+3	7.9E+2	9.3E+2	1.2E+3	2.0E+2
Highest 1h In/Out	0.05	0.04	0.04	0.04	0.05	0.04	0.05	0.04	0.00
Time of highest 1h Outdoor	11/4/14 23:14	11/5/14 19:12	11/6/14 18:34	11/7/14 21:37	11/8/14 22:26	11/9/14 23:02	11/10/14 22:00		
Corresponding highest 1h Indoor	11/4/14 23:36	11/5/14 19:45	11/6/14 19:01	11/8/14 0:01	11/9/14 0:52	11/9/14 23:36	11/10/14 23:07		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 11/4/2014 21:45, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-4-F-3. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100 nm to 2.5 micron measured using the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	4.9E+3	3.5E+3	4.2E+3	3.7E+3	4.5E+3	4.0E+3	3.2E+3	4.0E+3	5.6E+2
Outdoor 24 SD	2.8E+3	1.2E+3	2.3E+3	2.5E+3	3.0E+3	2.8E+3	2.3E+3	2.4E+3	5.6E+2
Indoor 24h mean	2.7E+2	2.1E+2	2.5E+2	2.1E+2	2.6E+2	2.3E+2	1.9E+2	2.3E+2	2.9E+1
Indoor 24 SD	2.2E+2	6.5E+1	1.0E+2	1.2E+2	1.5E+2	8.6E+1	1.3E+2	1.2E+2	4.8E+1
24h mean In/Out	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.00
Highest 8h Outdoor	7.7E+3	4.8E+3	6.6E+3	6.4E+3	8.1E+3	5.9E+3	5.7E+3	6.5E+3	1.1E+3
Highest 8h Indoor	4.3E+2	2.8E+2	3.7E+2	3.5E+2	4.5E+2	3.1E+2	3.3E+2	3.6E+2	5.7E+1
Highest 8 h In/Out	0.06	0.06	0.06	0.05	0.06	0.05	0.06	0.06	0.00
Highest 1h Outdoor	1.3E+4	5.6E+3	9.1E+3	9.2E+3	1.1E+4	9.6E+3	8.5E+3	9.4E+3	2.1E+3
Highest 1 h Indoor ²	4.3E+2	2.8E+2	3.7E+2	3.5E+2	4.5E+2	3.1E+2	3.3E+2	4.6E+2	9.7E+1
Highest 1h In/Out	0.05	0.06	0.05	0.05	0.05	0.04	0.05	0.05	0.01
Time of highest 1h Outdoor	11/4/14 23:13	11/5/14 19:23	11/6/14 18:23	11/7/14 23:42	11/9/14 0:06	11/9/14 19:22	11/10/14 22:33		
Corresponding highest 1h Indoor	11/4/14 23:40	11/5/14 21:32	11/6/14 18:55	11/8/14 0:10	11/9/14 1:00	11/9/14 23:22	11/10/14 23:11		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 11/4/2014 21:45, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-4-F-4. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6–100 nm based on difference between concentrations measured using the TSI 3787 CPC and the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.2E+4	9.5E+3	7.7E+3	1.0E+4	7.8E+3	7.9E+3	1.0E+4	9.3E+3	1.5E+3
Outdoor 24 SD	5.9E+3	4.7E+3	5.8E+3	8.0E+3	5.0E+3	4.6E+3	5.5E+3	5.7E+3	1.1E+3
Indoor 24h mean	4.6E+2	3.8E+2	3.6E+2	3.7E+2	3.6E+2	3.4E+2	3.7E+2	3.8E+2	3.7E+1
Indoor 24 SD	2.9E+2	1.6E+2	2.3E+2	2.1E+2	2.2E+2	1.5E+2	2.2E+2	2.1E+2	4.4E+1
24h mean In/Out	0.04	0.04	0.04	0.04	0.04	0.05	0.04	0.04	0.00
Highest 8h Outdoor	1.6E+4	1.4E+4	1.4E+4	1.5E+4	1.4E+4	1.0E+4	1.5E+4	1.4E+4	1.8E+3
Highest 8h Indoor	7.0E+2	5.7E+2	6.4E+2	6.0E+2	6.4E+2	4.8E+2	6.1E+2	6.1E+2	6.5E+1
Highest 8 h In/Out	0.04	0.04	0.05	0.04	0.05	0.05	0.04	0.04	0.00
Highest 1h Outdoor	2.1E+4	2.0E+4	2.4E+4	2.2E+4	1.7E+4	1.5E+4	2.0E+4	2.0E+4	2.8E+3
Highest 1h Indoor ²	7.0E+2	5.7E+2	6.4E+2	6.0E+2	6.4E+2	4.8E+2	6.1E+2	7.3E+2	9.7E+1
Highest 1h In/Out	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.01
Time of highest 1h Outdoor	11/5/14 8:12	11/5/14 19:12	11/6/14 18:43	11/7/14 21:36	11/8/14 22:26	11/9/14 19:47	11/10/14 21:58		
Corresponding highest 1h Indoor	11/5/14 8:32	11/5/14 19:45	11/6/14 19:01	11/8/14 0:00	11/9/14 0:47	11/9/14 20:18	11/10/14 23:05		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 11/4/2014 21:45, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-4-F-5. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100–300 nm based on difference between concentrations measured using the TSI 3781 CPC with size selector and the MetOne BT637S OPC

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	4.8E+6	3.4E+6	4.1E+6	3.6E+6	4.4E+6	3.9E+6	3.1E+6	3.9E+6	5.6E+5
Outdoor 24 SD	2.8E+6	1.2E+6	2.3E+6	2.4E+6	3.0E+6	2.8E+6	2.3E+6	2.4E+6	5.5E+5
Indoor 24h mean	2.7E+5	2.0E+5	2.4E+5	2.0E+5	2.6E+5	2.2E+5	1.9E+5	2.3E+5	2.9E+4
Indoor 24 SD	2.2E+5	6.4E+4	1.0E+5	1.1E+5	1.5E+5	8.4E+4	1.2E+5	1.2E+5	4.7E+4
24h mean In/Out	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.00
Highest 8h Outdoor	7.6E+6	4.7E+6	6.5E+6	6.3E+6	8.0E+6	5.8E+6	5.6E+6	6.4E+6	1.1E+6
Highest 8h Indoor	4.2E+5	2.8E+5	3.6E+5	3.4E+5	4.4E+5	3.1E+5	3.2E+5	3.5E+5	5.6E+4
Highest 8 h In/Out	0.06	0.06	0.06	0.05	0.06	0.05	0.06	0.06	0.00
Highest 1h Outdoor	1.3E+7	5.5E+6	8.9E+6	9.0E+6	1.1E+7	9.5E+6	8.4E+6	9.3E+6	2.0E+6
Highest 1h Indoor ²	4.2E+5	2.8E+5	3.6E+5	3.4E+5	4.4E+5	3.1E+5	3.2E+5	4.5E+5	9.5E+4
Highest 1h In/Out	0.05	0.06	0.04	0.05	0.05	0.04	0.05	0.05	0.01
Time of highest 1h Outdoor	11/4/14 23:13	11/5/14 19:23	11/6/14 18:23	11/7/14 23:42	11/9/14 0:06	11/9/14 19:22	11/10/14 22:33		
Corresponding highest 1h Indoor	11/4/14 23:40	11/5/14 21:32	11/6/14 18:55	11/8/14 0:10	11/9/14 1:00	11/9/14 23:22	11/10/14 23:11		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 11/4/2014 21:45, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-4-F-6. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.3–0.4 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	5.9E+4	6.5E+4	9.5E+4	7.3E+4	7.2E+4	7.2E+4	5.8E+4	7.1E+4	1.2E+4
Outdoor 24 SD	2.2E+4	2.4E+4	2.3E+4	2.6E+4	2.7E+4	2.7E+4	2.3E+4	2.5E+4	1.9E+3
Indoor 24h mean	3.7E+3	3.2E+3	5.0E+3	4.5E+3	4.9E+3	4.8E+3	3.5E+3	4.2E+3	7.0E+2
Indoor 24 SD	2.7E+3	7.6E+2	1.4E+3	1.9E+3	2.0E+3	1.6E+3	1.5E+3	1.7E+3	5.5E+2
24h mean In/Out	0.07	0.06	0.05	0.06	0.06	0.07	0.07	0.06	0.01
Highest 8h Outdoor	7.8E+4	8.0E+4	1.2E+5	1.1E+5	1.0E+5	1.0E+5	7.8E+4	9.5E+4	1.6E+4
Highest 8h Indoor	5.4E+3	2.9E+3	5.7E+3	4.5E+3	7.4E+3	6.5E+3	4.9E+3	5.3E+3	1.3E+3
Highest 8 h In/Out	0.07	0.04	0.05	0.04	0.07	0.06	0.06	0.06	0.01
Highest 1h Outdoor	1.1E+5	1.3E+5	1.3E+5	1.2E+5	1.2E+5	1.2E+5	8.8E+4	1.2E+5	1.4E+4
Highest 1 h Indoor ²	5.4E+3	2.9E+3	5.7E+3	4.5E+3	7.4E+3	6.5E+3	4.9E+3	6.2E+3	2.0E+3
Highest 1h In/Out	0.07	0.02	0.04	0.03	0.08	0.06	0.08	0.06	0.02
Time of highest 1h Outdoor	11/4/14 23:15	11/6/14 11:27	11/7/14 7:19	11/8/14 11:38	11/9/14 0:05	11/9/14 23:17	11/10/14 22:42		
Corresponding highest 1h Indoor	11/4/14 23:41	11/6/14 15:27	11/7/14 7:19	11/8/14 12:16	11/9/14 0:58	11/9/14 23:45	11/10/14 23:16		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 11/4/2014 21:45, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-4-F-7. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.4–0.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.2E+4	1.4E+4	2.1E+4	1.4E+4	1.2E+4	1.3E+4	1.1E+4	1.4E+4	3.3E+3
Outdoor 24 SD	5.3E+3	1.1E+4	4.9E+3	8.2E+3	6.1E+3	7.7E+3	5.4E+3	7.0E+3	2.2E+3
Indoor 24h mean	6.0E+2	4.6E+2	7.0E+2	5.8E+2	6.2E+2	6.0E+2	4.8E+2	5.8E+2	7.6E+1
Indoor 24 SD	6.2E+2	1.3E+2	2.3E+2	2.8E+2	3.1E+2	2.3E+2	2.6E+2	3.0E+2	1.4E+2
24h mean In/Out	0.05	0.05	0.03	0.04	0.04	0.05	0.05	0.04	0.01
Highest 8h Outdoor	1.7E+4	2.1E+4	2.8E+4	2.1E+4	1.9E+4	1.9E+4	1.5E+4	2.0E+4	3.9E+3
Highest 8h Indoor	9.2E+2	4.2E+2	6.4E+2	5.6E+2	1.0E+3	8.3E+2	7.0E+2	7.2E+2	1.9E+2
Highest 8 h In/Out	0.06	0.02	0.02	0.03	0.05	0.04	0.05	0.04	0.01
Highest 1h Outdoor	2.6E+4	5.1E+4	3.6E+4	3.2E+4	2.5E+4	2.8E+4	1.9E+4	3.1E+4	9.6E+3
Highest 1 h Indoor ²	9.2E+2	4.2E+2	6.4E+2	5.6E+2	1.0E+3	8.3E+2	7.0E+2	8.6E+2	3.6E+2
Highest 1h In/Out	0.05	0.01	0.01	0.01	0.05	0.04	0.06	0.03	0.02
Time of highest 1h Outdoor	11/4/14 23:12	11/6/14 11:27	11/6/14 13:00	11/8/14 11:38	11/8/14 23:58	11/9/14 23:18	11/10/14 22:41		
Corresponding highest 1h Indoor	11/4/14 23:33	11/6/14 11:27	11/6/14 16:55	11/8/14 12:05	11/9/14 0:54	11/9/14 23:41	11/10/14 23:11		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 11/4/2014 21:45, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-4-F-8. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.5–0.7 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	7.8E+3	8.6E+3	1.4E+4	7.2E+3	5.8E+3	6.0E+3	5.0E+3	7.7E+3	2.6E+3
Outdoor 24 SD	3.5E+3	6.9E+3	3.6E+3	4.4E+3	3.4E+3	6.5E+3	2.8E+3	4.4E+3	1.5E+3
Indoor 24h mean	3.5E+2	2.7E+2	4.5E+2	3.0E+2	3.0E+2	2.7E+2	2.3E+2	3.1E+2	6.6E+1
Indoor 24 SD	4.0E+2	9.1E+1	1.7E+2	1.5E+2	1.6E+2	1.2E+2	1.5E+2	1.8E+2	9.4E+1
24h mean In/Out	0.04	0.04	0.03	0.04	0.04	0.05	0.05	0.04	0.01
Highest 8h Outdoor	1.1E+4	1.2E+4	2.0E+4	9.6E+3	9.9E+3	9.0E+3	7.6E+3	1.1E+4	3.7E+3
Highest 8h Indoor	4.9E+2	3.0E+2	5.0E+2	4.6E+2	5.0E+2	3.8E+2	3.7E+2	4.3E+2	7.2E+1
Highest 8 h In/Out	0.04	0.02	0.03	0.05	0.05	0.04	0.05	0.04	0.01
Highest 1h Outdoor	1.8E+4	3.0E+4	2.3E+4	1.6E+4	1.4E+4	1.7E+4	1.1E+4	1.8E+4	5.7E+3
Highest 1 h Indoor ²	4.9E+2	3.0E+2	5.0E+2	4.6E+2	5.0E+2	3.8E+2	3.7E+2	4.9E+2	1.7E+2
Highest 1h In/Out	0.04	0.01	0.02	0.01	0.04	0.03	0.05	0.03	0.02
Time of highest 1h Outdoor	11/4/14 23:11	11/6/14 11:28	11/6/14 13:00	11/8/14 10:42	11/8/14 23:58	11/9/14 19:22	11/10/14 22:33		
Corresponding highest 1h Indoor	11/4/14 23:35	11/6/14 15:28	11/6/14 16:52	11/8/14 10:51	11/9/14 0:55	11/9/14 23:22	11/10/14 23:11		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 11/4/2014 21:45, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-4-F-9. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.7–1.0 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.8E+3	2.2E+3	5.0E+3	1.5E+3	1.0E+3	1.1E+3	8.6E+2	1.9E+3	1.3E+3
Outdoor 24 SD	8.3E+2	1.6E+3	2.8E+3	8.2E+2	6.2E+2	2.1E+3	6.1E+2	1.3E+3	7.7E+2
Indoor 24h mean	6.7E+1	6.0E+1	1.6E+2	6.0E+1	5.0E+1	4.5E+1	4.4E+1	6.9E+1	3.6E+1
Indoor 24 SD	7.7E+1	2.3E+1	7.8E+1	2.8E+1	2.7E+1	1.9E+1	2.6E+1	4.0E+1	2.4E+1
24h mean In/Out	0.04	0.03	0.03	0.04	0.04	0.04	0.05	0.04	0.01
Highest 8h Outdoor	4.0E+3	2.7E+3	8.0E+3	1.9E+3	1.8E+3	1.7E+3	1.4E+3	3.1E+3	2.2E+3
Highest 8h Indoor	2.2E+2	1.2E+2	2.4E+2	8.2E+1	8.4E+1	6.3E+1	6.9E+1	1.3E+2	6.9E+1
Highest 8 h In/Out	0.06	0.05	0.03	0.04	0.05	0.04	0.05	0.04	0.01
Highest 1h Outdoor	4.0E+3	7.1E+3	8.9E+3	2.8E+3	2.4E+3	4.8E+3	2.3E+3	4.6E+3	2.3E+3
Highest 1 h Indoor ²	2.2E+2	1.2E+2	2.4E+2	8.2E+1	8.4E+1	6.3E+1	6.9E+1	1.6E+2	7.5E+1
Highest 1h In/Out	0.06	0.03	0.03	0.03	0.04	0.02	0.05	0.04	0.01
Time of highest 1h Outdoor	11/4/14 14:36	11/6/14 13:00	11/6/14 16:23	11/8/14 7:51	11/8/14 23:58	11/9/14 19:22	11/10/14 22:33		
Corresponding highest 1h Indoor	11/4/14 14:36	11/6/14 16:58	11/6/14 19:07	11/8/14 8:18	11/9/14 0:53	11/9/14 19:41	11/10/14 23:08		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 11/4/2014 21:45, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-4-F-10. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 1.0–2.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	7.8E+2	1.2E+3	3.7E+3	9.4E+2	5.5E+2	5.9E+2	4.9E+2	1.2E+3	1.1E+3
Outdoor 24 SD	3.2E+2	7.8E+2	2.6E+3	6.3E+2	2.6E+2	9.5E+2	3.5E+2	8.5E+2	7.7E+2
Indoor 24h mean	3.3E+1	2.7E+1	8.2E+1	2.8E+1	2.1E+1	2.0E+1	2.1E+1	3.3E+1	2.0E+1
Indoor 24 SD	5.0E+1	1.0E+1	4.5E+1	1.5E+1	1.0E+1	7.9E+0	1.1E+1	2.1E+1	1.7E+1
24h mean In/Out	0.08	0.03	0.02	0.03	0.03	0.03	0.04	0.04	0.02
Highest 8h Outdoor	1.2E+3	1.3E+3	6.9E+3	1.5E+3	8.9E+2	8.9E+2	8.1E+2	1.9E+3	2.0E+3
Highest 8h Indoor	3.5E+2	6.0E+1	1.3E+2	3.6E+1	2.2E+1	2.7E+1	3.1E+1	9.4E+1	1.1E+2
Highest 8 h In/Out	0.28	0.05	0.02	0.02	0.02	0.03	0.04	0.07	0.09
Highest 1h Outdoor	1.7E+3	3.6E+3	7.7E+3	2.5E+3	1.0E+3	2.3E+3	1.2E+3	2.9E+3	2.1E+3
Highest 1 h Indoor ²	3.5E+2	6.0E+1	1.3E+2	3.6E+1	2.2E+1	2.7E+1	3.1E+1	7.3E+1	4.5E+1
Highest 1h In/Out	0.03	0.03	0.02	0.02	0.04	0.01	0.04	0.03	0.01
Time of highest 1h Outdoor	11/4/14 23:12	11/6/14 13:00	11/6/14 17:00	11/7/14 13:13	11/8/14 23:58	11/9/14 19:22	11/10/14 22:32		
Corresponding highest 1h Indoor	11/4/14 23:30	11/6/14 17:00	11/6/14 19:08	11/7/14 13:51	11/9/14 1:23	11/9/14 19:41	11/10/14 23:10		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 11/4/2014 21:45, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-4-F-11. Summary statistics for estimated PM_{2.5} concentrations ($\mu\text{g m}^{-3}$) calculated from particle number concentrations resolved by size from 6 nm to 2.5 microns (as reported in Tables X-2 to X-9) and resulting indoor/outdoor ratios.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	3.2E+1	3.0E+1	5.3E+1	2.8E+1	2.8E+1	2.6E+1	2.2E+1	3.1E+1	9.2E+0
Outdoor 24 SD	1.5E+1	9.3E+0	2.3E+1	1.3E+1	1.6E+1	1.9E+1	1.3E+1	1.6E+1	4.2E+0
Indoor 24h mean	1.7E+0	1.3E+0	2.0E+0	1.4E+0	1.6E+0	1.4E+0	1.2E+0	1.5E+0	2.5E-1
Indoor 24 SD	1.3E+0	3.7E-1	7.8E-1	6.6E-1	8.3E-1	5.2E-1	7.0E-1	7.4E-1	2.7E-1
24h mean In/Out	0.06	0.05	0.04	0.05	0.05	0.05	0.05	0.05	0.01
Highest 8h Outdoor	4.7E+1	3.5E+1	7.9E+1	4.2E+1	4.8E+1	3.8E+1	3.5E+1	4.6E+1	1.4E+1
Highest 8h Indoor	2.5E+0	1.7E+0	2.9E+0	2.2E+0	2.6E+0	1.9E+0	1.9E+0	2.2E+0	4.0E-1
Highest 8 h In/Out	0.05	0.05	0.04	0.05	0.05	0.05	0.06	0.05	0.01
Highest 1h Outdoor	7.6E+1	5.0E+1	9.8E+1	5.7E+1	6.2E+1	6.5E+1	5.2E+1	6.6E+1	1.5E+1
Highest 1 h Indoor ²	2.5E+0	1.7E+0	2.9E+0	2.2E+0	2.6E+0	1.9E+0	1.9E+0	2.8E+0	5.5E-1
Highest 1h In/Out	0.05	0.04	0.03	0.05	0.05	0.03	0.05	0.04	0.01
Time of highest 1h Outdoor	11/4/14 23:13	11/6/14 13:00	11/6/14 18:23	11/7/14 23:42	11/9/14 0:05	11/9/14 19:22	11/10/14 22:33		
Corresponding highest 1h Indoor	11/4/14 23:38	11/6/14 17:00	11/6/14 19:00	11/8/14 0:08	11/9/14 1:00	11/9/14 23:22	11/10/14 23:10		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 11/4/2014 21:45, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-4-F-12. Summary statistics for concentrations of PM_{2.5} ($\mu\text{g m}^{-3}$) and indoor /outdoor ratios from measurements reported by TSI DustTrak II.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	4.7E-2	5.1E-2	8.6E-2	5.1E-2	5.0E-2	4.6E-2	3.0E-2	5.2E-2	1.5E-2
Outdoor 24 SD	2.2E-2	2.6E-2	1.6E-2	2.3E-2	2.5E-2	2.6E-2	1.6E-2	2.2E-2	4.1E-3
Indoor 24h mean	2.5E-3	1.4E-3	2.4E-3	2.0E-3	2.6E-3	5.6E-3	5.8E-3	3.2E-3	1.6E-3
Indoor 24 SD	4.6E-3	1.8E-3	3.7E-3	2.9E-3	3.8E-3	1.3E-2	8.0E-3	5.4E-3	3.6E-3
24h mean In/Out	0.06	0.04	0.03	0.03	0.04	0.09	0.15	0.06	0.04
Highest 8h Outdoor	6.7E-2	6.5E-2	9.9E-2	7.3E-2	7.9E-2	6.9E-2	4.6E-2	7.1E-2	1.5E-2
Highest 8h Indoor	4.4E-3	1.0E-3	4.0E-3	1.6E-3	4.6E-3	1.4E-2	1.1E-2	5.9E-3	4.6E-3
Highest 8 h In/Out	0.07	0.02	0.04	0.02	0.06	0.20	0.25	0.09	0.09
Highest 1h Outdoor	1.1E-1	1.3E-1	1.1E-1	9.5E-2	1.0E-1	1.2E-1	6.5E-2	1.0E-1	1.8E-2
Highest 1 h Indoor ²	4.4E-3	1.0E-3	4.0E-3	1.6E-3	4.6E-3	1.4E-2	1.1E-2	1.7E-2	1.9E-2
Highest 1h In/Out	0.08	0.01	0.01	0.10	0.12	0.49	0.40	0.17	0.18
Time of highest 1h Outdoor	11/4/14 23:05	11/6/14 11:37	11/6/14 13:00	11/7/14 23:51	11/9/14 0:05	11/9/14 23:18	11/10/14 22:42		
Corresponding highest 1h Indoor	11/5/14 0:02	11/6/14 15:37	11/6/14 17:00	11/8/14 0:27	11/9/14 0:44	11/10/14 0:55	11/11/14 0:02		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 11/4/2014 21:45, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-4-F-13. Daily¹ summary statistics for concentrations (nanograms m^{-3}) and indoor /outdoor ratios of aerosol black carbon measured using the Aethalometer AE22.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.9E+3	1.4E+3	2.1E+3	1.5E+3	1.7E+3	1.5E+3	1.5E+3	1.7E+3	2.5E+2
Outdoor 24 SD	1.2E+3	5.4E+2	1.1E+3	1.1E+3	1.1E+3	8.6E+2	1.3E+3	1.0E+3	2.3E+2
Indoor 24h mean	1.4E+2	1.0E+2	1.4E+2	1.1E+2	1.5E+2	1.3E+2	1.4E+2	1.3E+2	1.6E+1
Indoor 24 SD	8.6E+1	7.0E+1	1.1E+2	1.1E+2	1.5E+2	9.8E+1	1.5E+2	1.1E+2	2.7E+1
24h mean In/Out	0.15	0.07	0.06	0.07	0.08	0.09	0.09	0.09	0.03
Highest 8h Outdoor	2.8E+3	2.0E+3	3.5E+3	2.7E+3	2.9E+3	2.4E+3	2.8E+3	2.7E+3	4.4E+2
Highest 8h Indoor	2.0E+2	1.5E+2	2.6E+2	2.2E+2	2.8E+2	2.1E+2	2.6E+2	2.3E+2	4.1E+1
Highest 8 h In/Out	0.07	0.08	0.07	0.08	0.10	0.09	0.09	0.08	0.01
Highest 1h Outdoor	4.2E+3	2.3E+3	4.0E+3	4.3E+3	4.1E+3	3.4E+3	4.1E+3	3.8E+3	6.7E+2
Highest 1 h Indoor ²	2.0E+2	1.5E+2	2.6E+2	2.2E+2	2.8E+2	2.1E+2	2.6E+2	3.1E+2	7.8E+1
Highest 1h In/Out	0.07	0.08	0.07	0.08	0.11	0.08	0.09	0.08	0.01
Time of highest 1h Outdoor	11/4/14 23:21	11/5/14 20:42	11/7/14 0:24	11/7/14 23:45	11/9/14 1:12	11/10/14 4:15	11/10/14 21:12		
Corresponding highest 1h Indoor	11/5/14 0:03	11/5/14 21:00	11/7/14 2:18	11/8/14 0:09	11/9/14 1:57	11/10/14 7:12	11/10/14 21:18		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 11/4/2014 21:45, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-4-F-14. Daily¹ summary statistics for concentrations (ppb) and indoor /outdoor ratios of ozone measured with 2B Technologies Model 202 analyzers.

Parameter	Day 0¹	Day 1¹	Day 2	Day 3	Day 4	Day 5	Mean¹	SD¹
Outdoor 24h mean	2.4E+01	2.4E+01	2.5E+01	2.9E+01	2.1E+01	2.3E+01	2.4E+01	2.4E+00
Outdoor 24 SD	1.0E+01	8.3E+00	1.0E+01	1.5E+01	5.7E+00	8.7E+00	9.7E+00	2.7E+00
Indoor 24h mean	1.4E+00	1.5E+00	1.5E+00	1.6E+00	1.6E+00	1.6E+00	1.5E+00	5.9E-02
Indoor 24 SD	5.3E-01	5.2E-01	5.4E-01	5.5E-01	5.3E-01	5.4E-01	5.4E-01	8.6E-03
24h mean In/Out	0.05	0.07	0.06	0.06	0.06	0.08	0.06	0.01
Highest 8h Outdoor	3.7E+01	3.5E+01	3.9E+01	4.8E+01	2.7E+01	3.4E+01	3.7E+01	6.1E+00
Highest 8h Indoor	1.4E+00	1.5E+00	1.6E+00	1.6E+00	1.6E+00	1.6E+00	1.6E+00	6.5E-02
Highest 8h In/Out	0.04	0.04	0.04	0.03	0.06	0.05	0.04	0.01
Highest 1h Outdoor	4.9E+01	4.0E+01	4.4E+01	5.9E+01	3.5E+01	3.9E+01	4.4E+01	8.1E+00
Highest 1h Indoor ²	1.4E+00	1.5E+00	1.6E+00	1.6E+00	1.6E+00	1.6E+00	1.6E+00	1.0E-01
Highest 1h In/Out	0.03	0.04	0.04	0.03	0.05	0.04	0.04	0.01
Time of highest 1h Outdoor	7/16 16:32	7/17 16:04	7/18 16:08	7/19 15:11	7/20 14:49	7/21 16:39		
Corresponding highest 1h Indoor ²	7/16 16:32	7/17 16:04	7/18 19:02	7/19 15:13	7/20 14:49	7/21 16:48		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 11/4/2014 21:45, and has <24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Appendix FW-5-A. Results for System A, November 11-17, 2014.

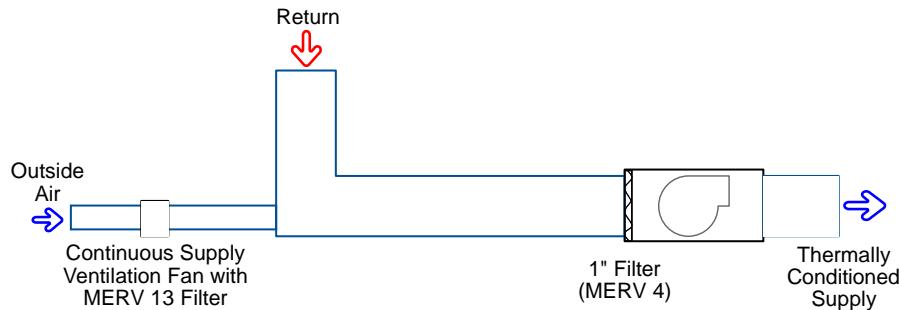


Table FW-5-A-1. Description of **System A** component characteristics during the period of **November 11-17, 2014**

System Parameter	Description or Measured Value
Heating	75,000 BTU/h, 80% eff., gas furnace, 1-stage burner
Cooling	3 ton, SEER13 air conditioner
Thermal distribution	Central fan with PSC motor: 1200 cfm for cooling, 1074 cfm for heating
Ventilation	Supply fan discharging into the return plenum. Set to 38 cfm continuous
Filtration	MERV4, 1" (Purolator F312) filter installed inside the FAU cabinet. A MERV13, 2" (AirGaurd DPgreen13) installed where the continuous supply air discharges into the return plenum.
Recirculation blower schedule	As required for thermal conditioning, no fan cycler.
VOC removal system	None

Notes about this monitoring period

There were no major instrument problems for this operational period.

The 24 h running statistics in the figures starts at 11/11/2014 20:30.

There was a rain event on 11/13/2014, and 11/14 had an extended period of fog.

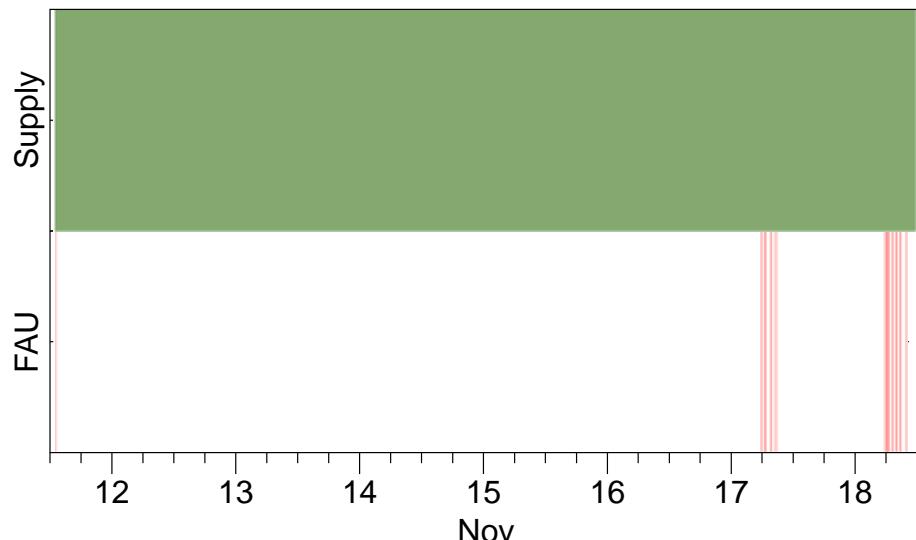


Figure FW-5-A-1. Operation of mechanical systems: Supply fan; fan on central forced air unit (FAU).

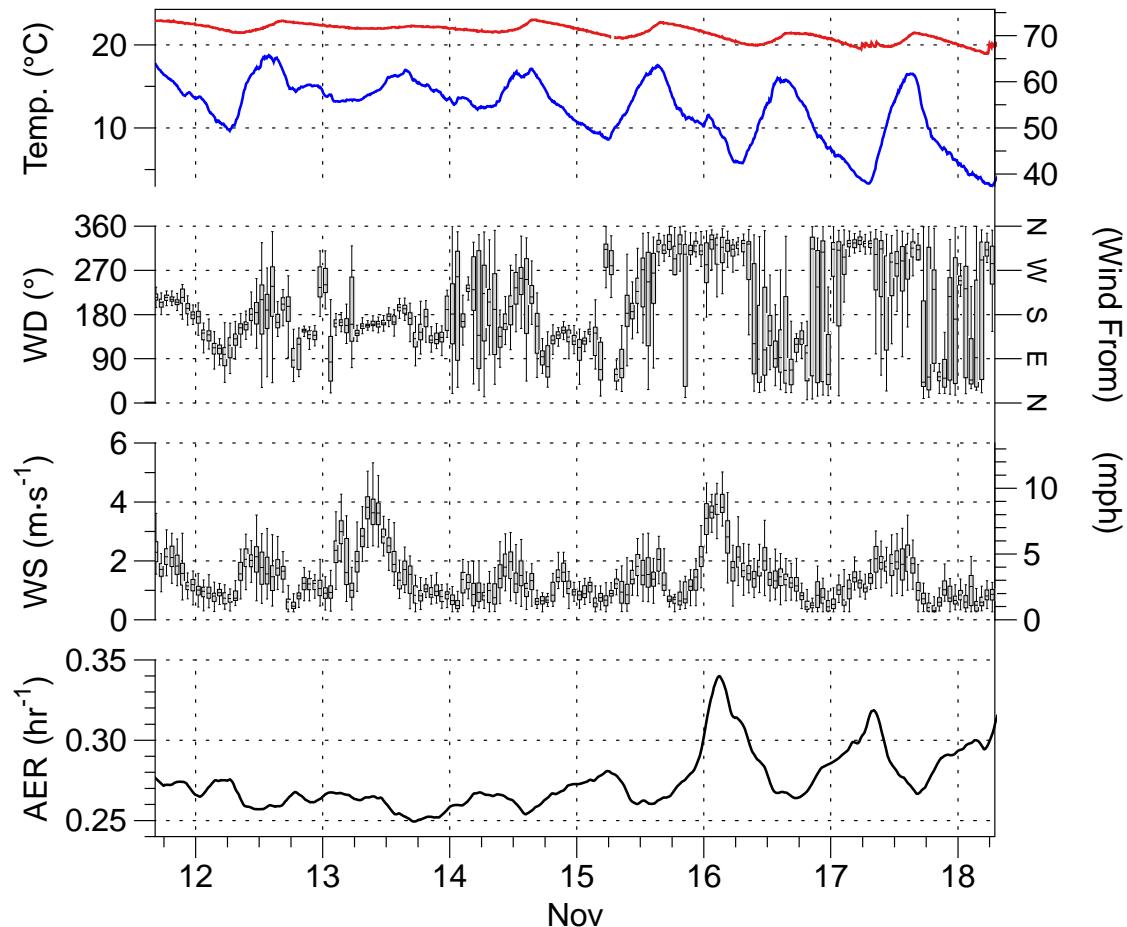


Figure FW-5-A-2. Environmental parameters measured during operation of System A, Nov 11-17, 2014. From top to bottom: indoor (red) and outdoor (blue) temperatures, wind direction (WD) in units of degrees from North, wind speed (WS), and air exchange rate (AER). For WD and WS, the box for each hour shows the 25th, 50th and 75th percentiles of the measured values and whiskers extend 1.5X the interquartile range (75th-25th percentile values) above the 75th and below the 25th percentile values.

Guide to plots of pollutant concentration time series and indoor / outdoor (I/O) ratios

The bottom section of each plot shows outdoor and indoor time series using the resolution of data collection: 3-min for black carbon and 1-min for all other parameters. The top and bottom of grey band are LOESS-smoothed, 1-min (or 3-min for black carbon) time-series. Also shown are time series with 1h and 24h time averaging for most pollutants. Triangles in bottom of plot indicate the highest 1h outdoor and corresponding highest 1h indoor average during each day. The top section of each plot shows the ratio of indoor to outdoor running 24h mean values (8h for ozone) and the ratios of highest 1h indoor to corresponding highest 1h outdoor concentration each day.

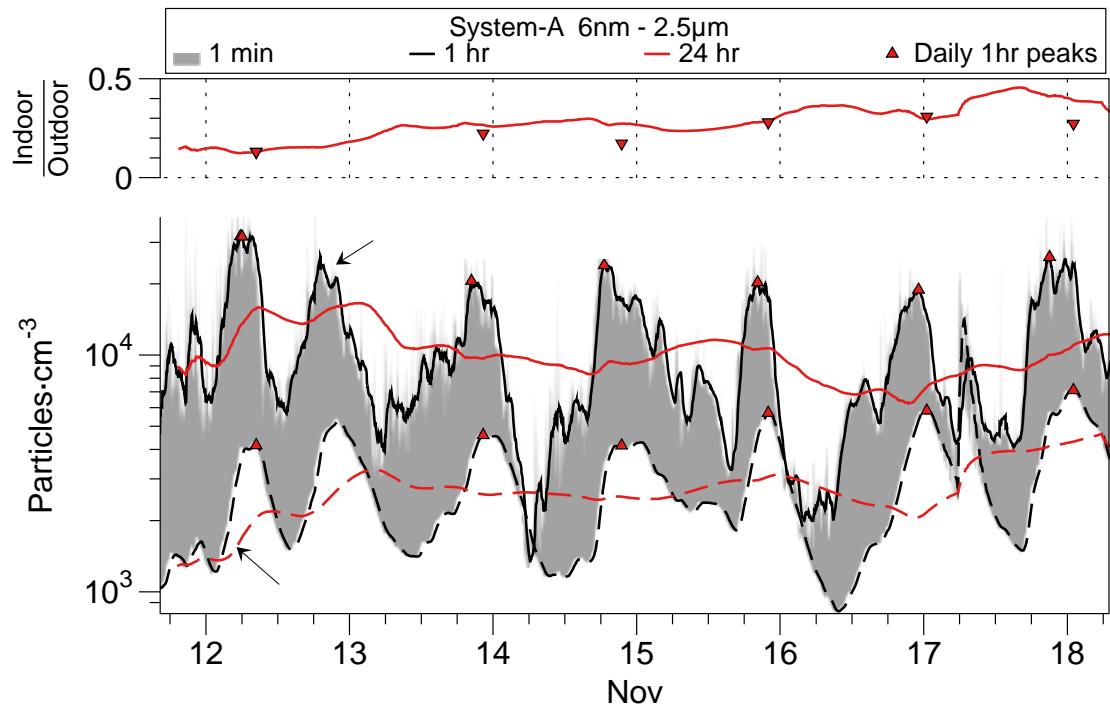


Figure FW-5-A-3. Number concentrations of 6 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of System A, Nov 11-17, 2014. Data collected using TSI 3787 CPCs.

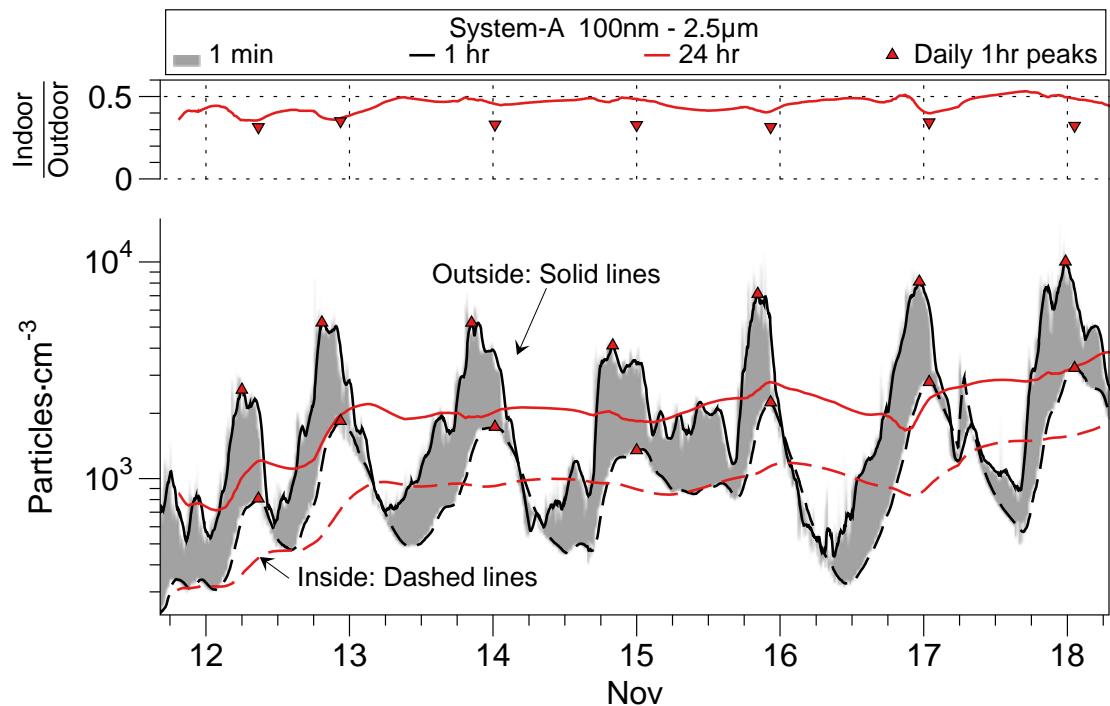


Figure FW-5-A-4. Number concentrations of 100 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of System A, Nov 11-17, 2014. Data collected using TSI 3781 CPCs outfitted with screens to exclude particles smaller than 100 nm. Refer to “Guide” before Figure FW-5-A-3.

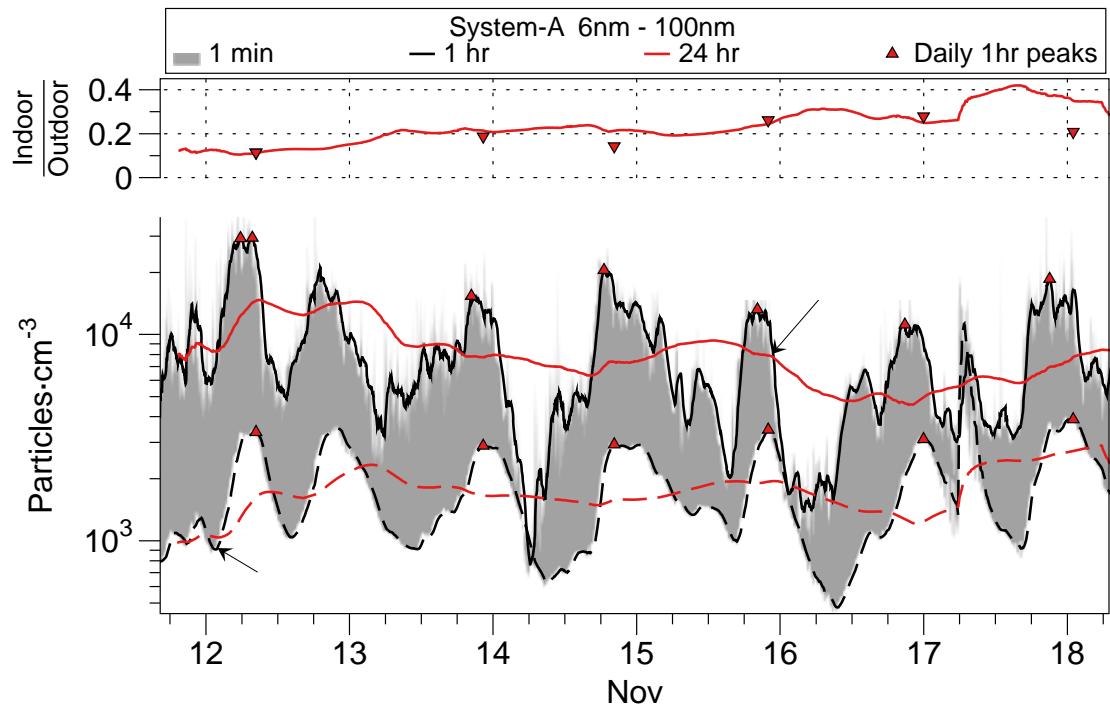


Figure FW-5-A-5. Number concentrations of 6–100 nm diameter particles measured outdoors and indoors during operation of System A, Nov 11–17, 2014. Data obtained as the difference between time series show in prior two figures. Refer to “Guide” before Figure FW-5-A-3.

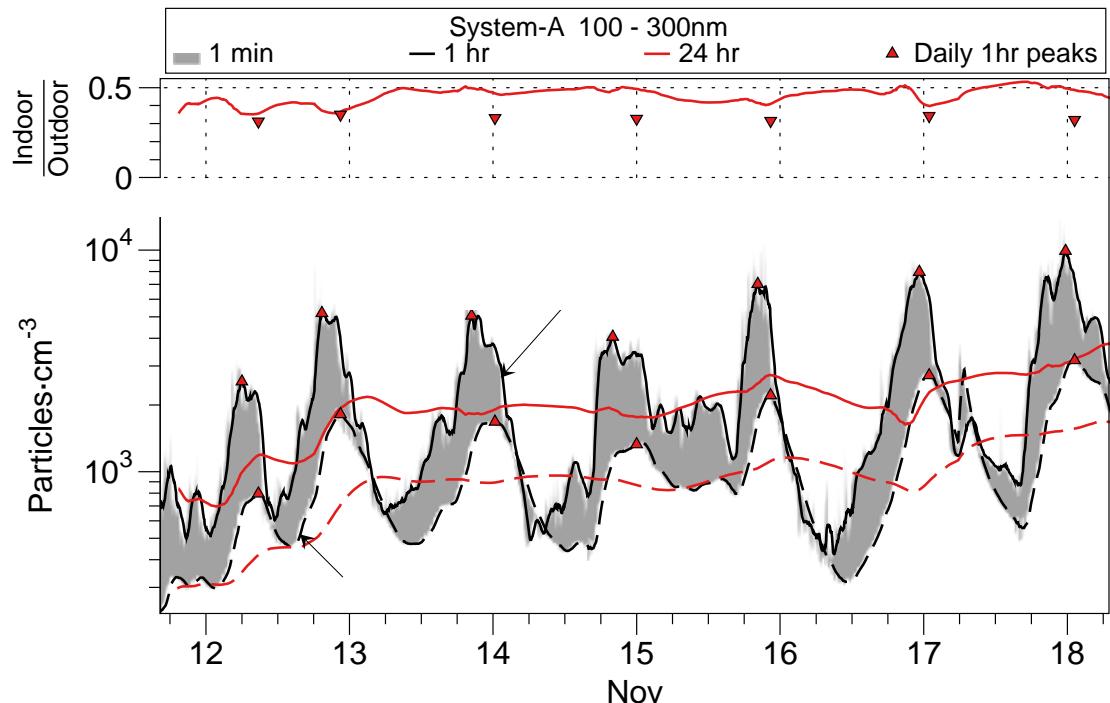


Figure FW-5-A-6. Number concentrations of 100–300 nm diameter particles measured outdoors and indoors during operation of System A, Nov 11–17, 2014, 2014. Data obtained as the difference between the TSI 3781 CPC with size selector and the MetOne BT637S OPC. Refer to “Guide” before Figure FW-5-A-3.

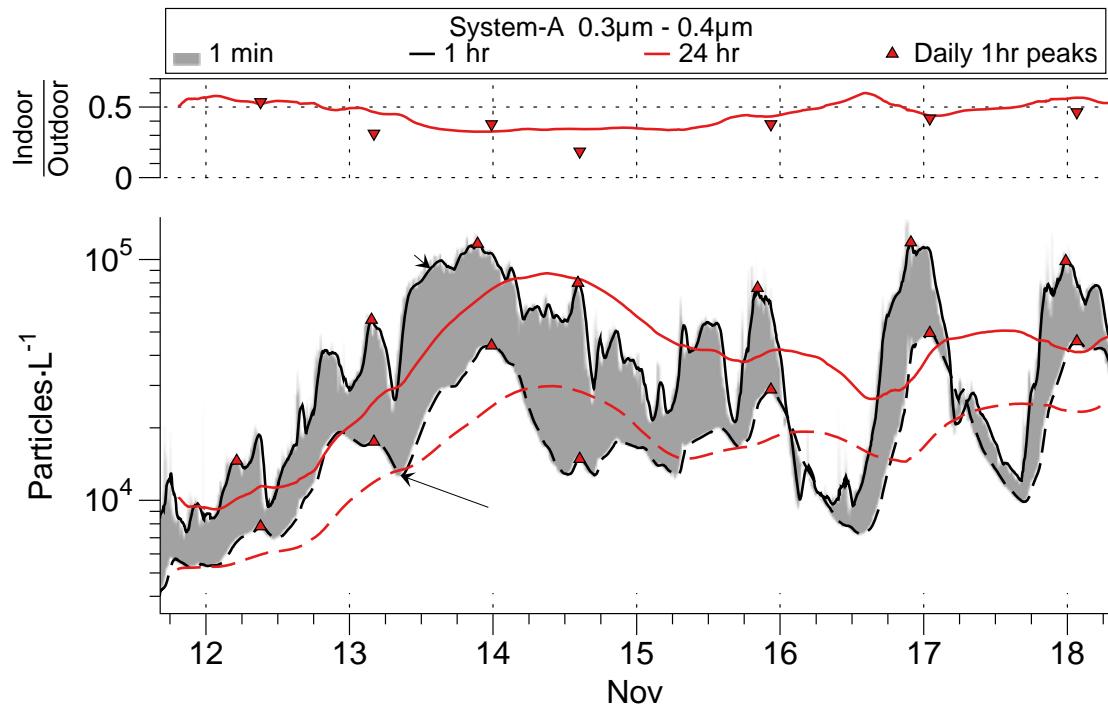


Figure FW-5-A-7. Number concentrations of 0.3–0.4 μm diameter particles measured outdoors and indoors during operation of System A, Nov 11-17, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-5-A-3.

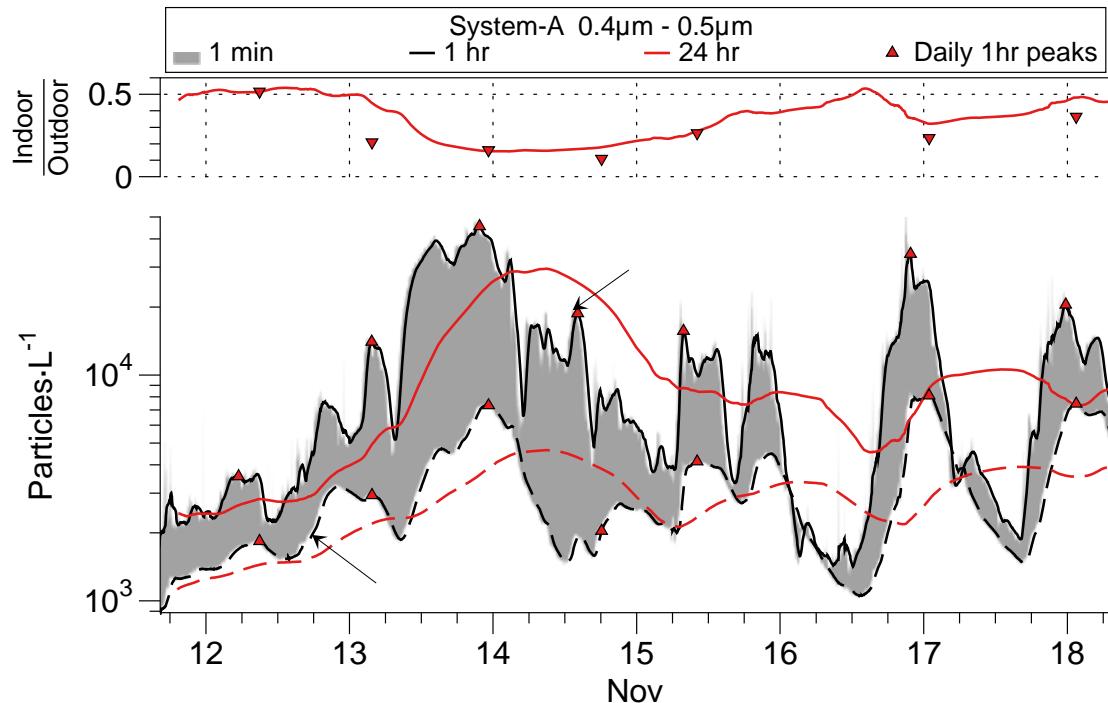


Figure FW-5-A-8. Number concentrations of 0.4–0.5 μm diameter particles measured outdoors and indoors during operation of System A, Nov 11-17, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-5-A-3.

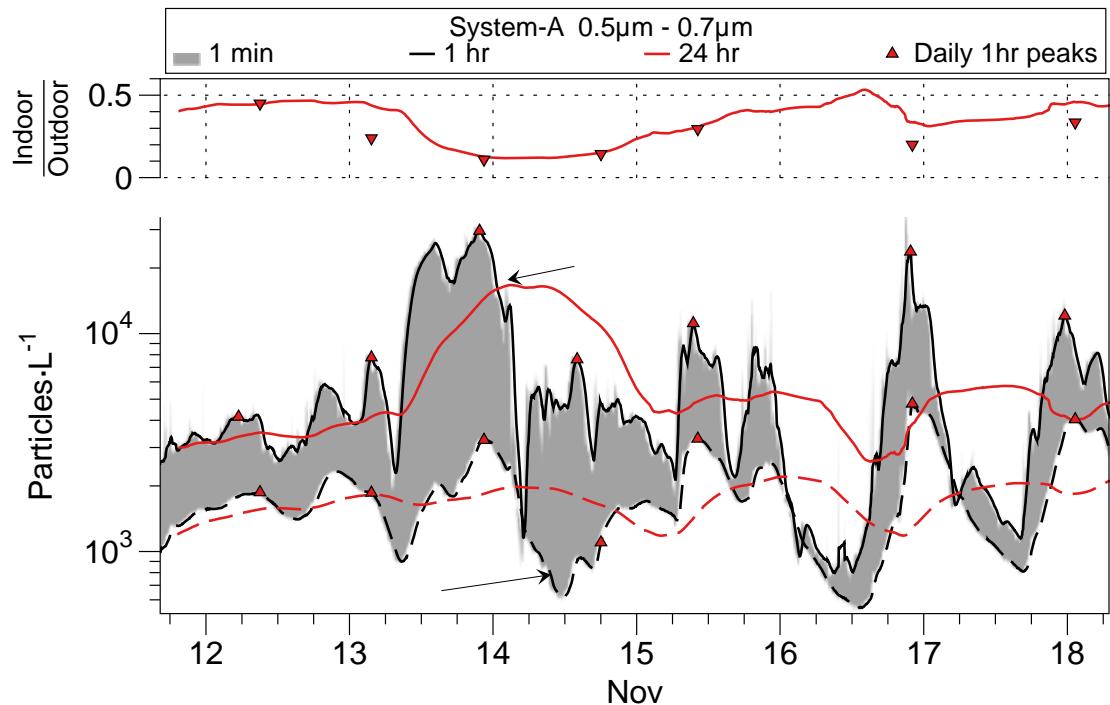


Figure FW-5-A-9. Number concentrations of 0.5–0.7 μm diameter particles measured outdoors and indoors during operation of System A, Nov 11-17, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-5-A-3.

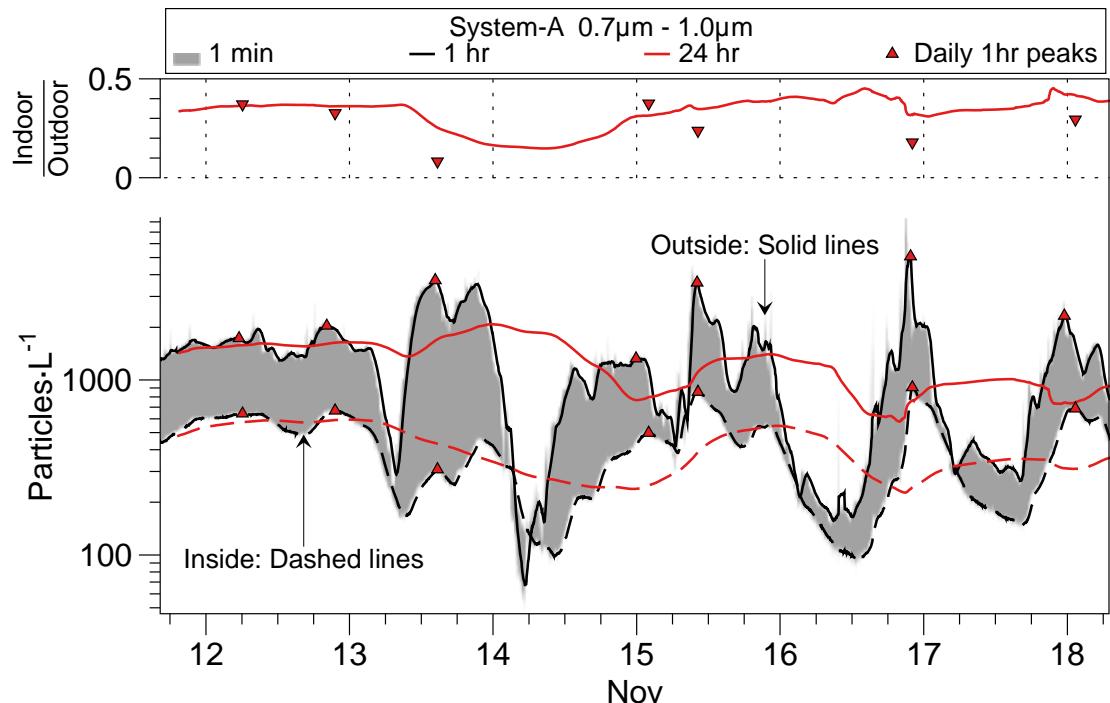


Figure FW-5-A-10. Number concentrations of 0.7–1.0 μm diameter particles measured outdoors and indoors during operation of System A, Nov 11-17, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-5-A-3.

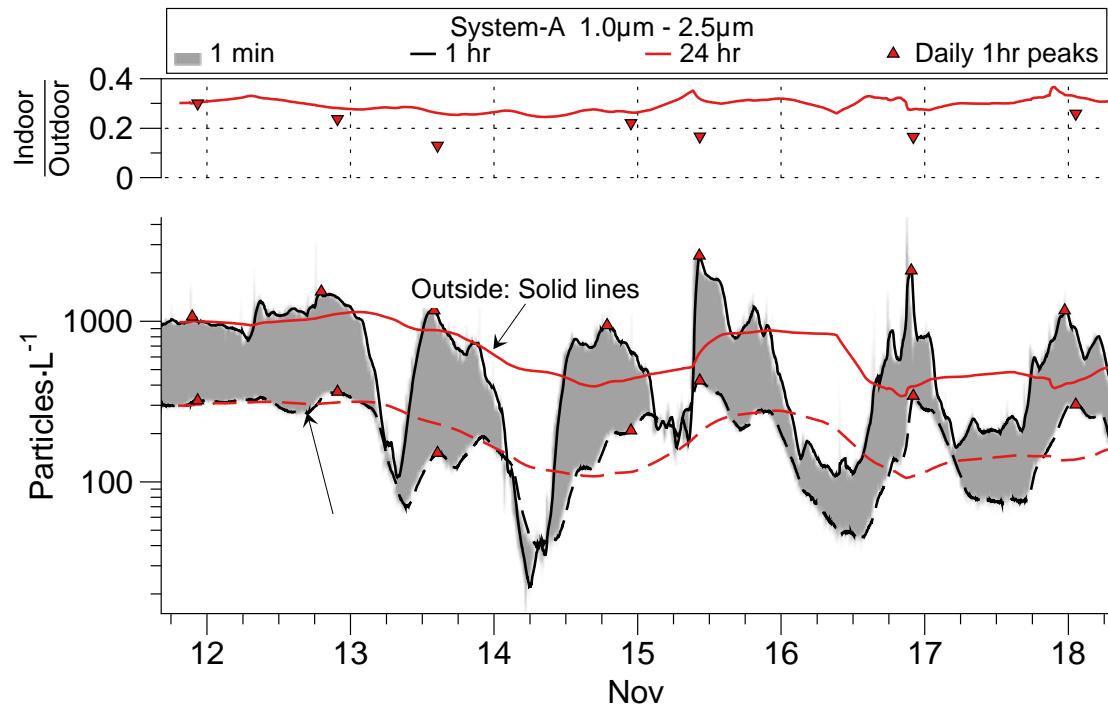


Figure FW-5-A-11. Number concentrations of 1.0–2.5 μm diameter particles measured outdoors and indoors during operation of System A, Nov 11-17, 2014. Data collected using MetOne BT637S particle counters. Refer to Figure FW-5-A-3 for details.

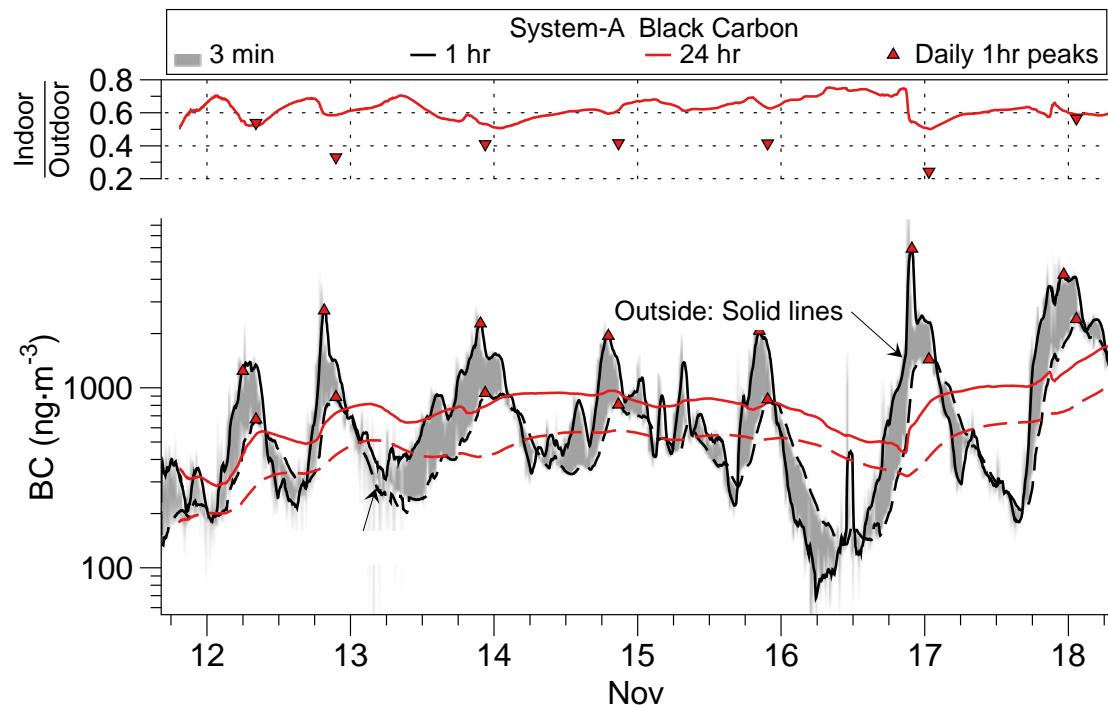


Figure FW-5-A-12. Black carbon concentrations measured outdoors and indoors during operation of System A, Nov 11-17, 2014. Data collected using AE22 Aethalometers with 3-min samples. Data otherwise as described in Figure FW-5-A-3 caption.

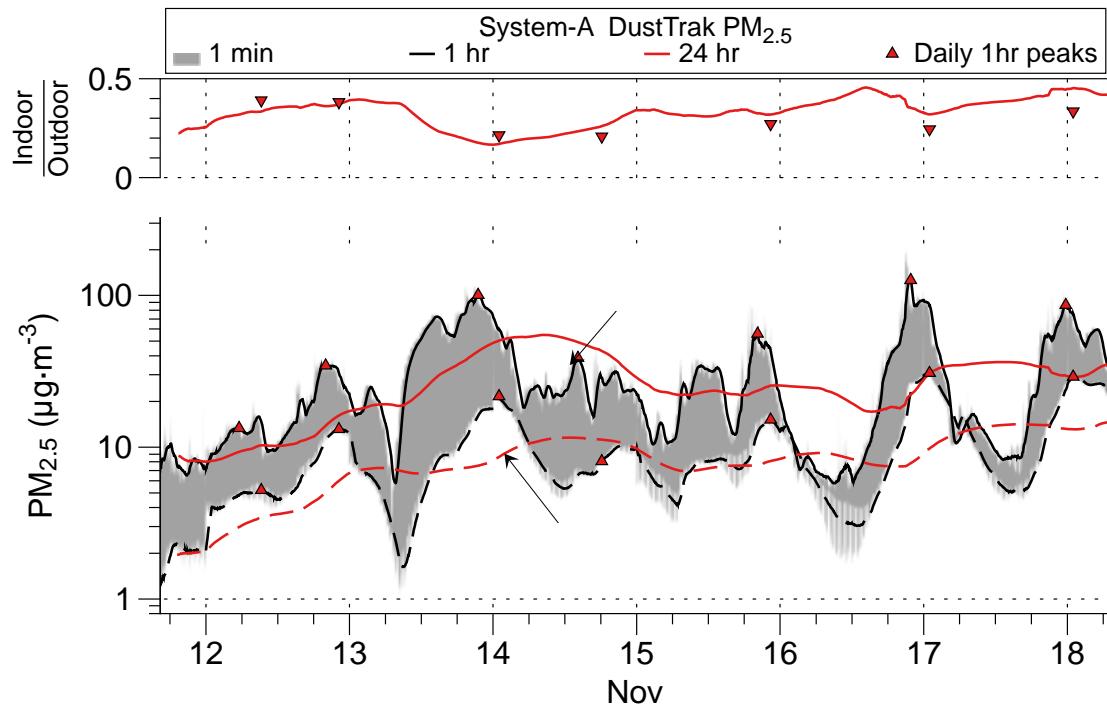


Figure FW-5-A-13. PM_{2.5} reported by TSI DustTrak II 8530 measurements outdoors and indoors during operation of System A, Nov 11-17, 2014. The DustTrak measures light scattering and uses a calibration to estimate PM_{2.5} mass. Refer to “Guide” before Figure FW-5-A-3.

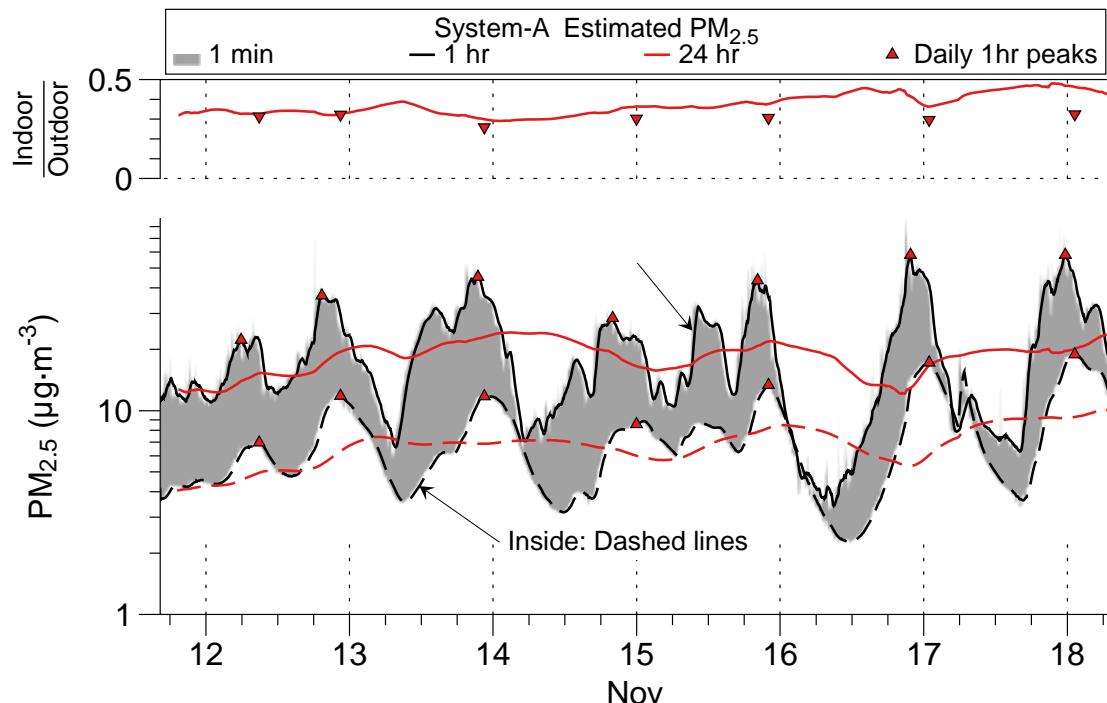


Figure FW-5-A-14. Estimated PM_{2.5} concentration calculated from size-resolved particle number concentrations measured by MetOne and CPC during operation of System A, Nov 11-17, 2014. Details provided in body of report. Refer to “Guide” before Figure FW-5-A-3.

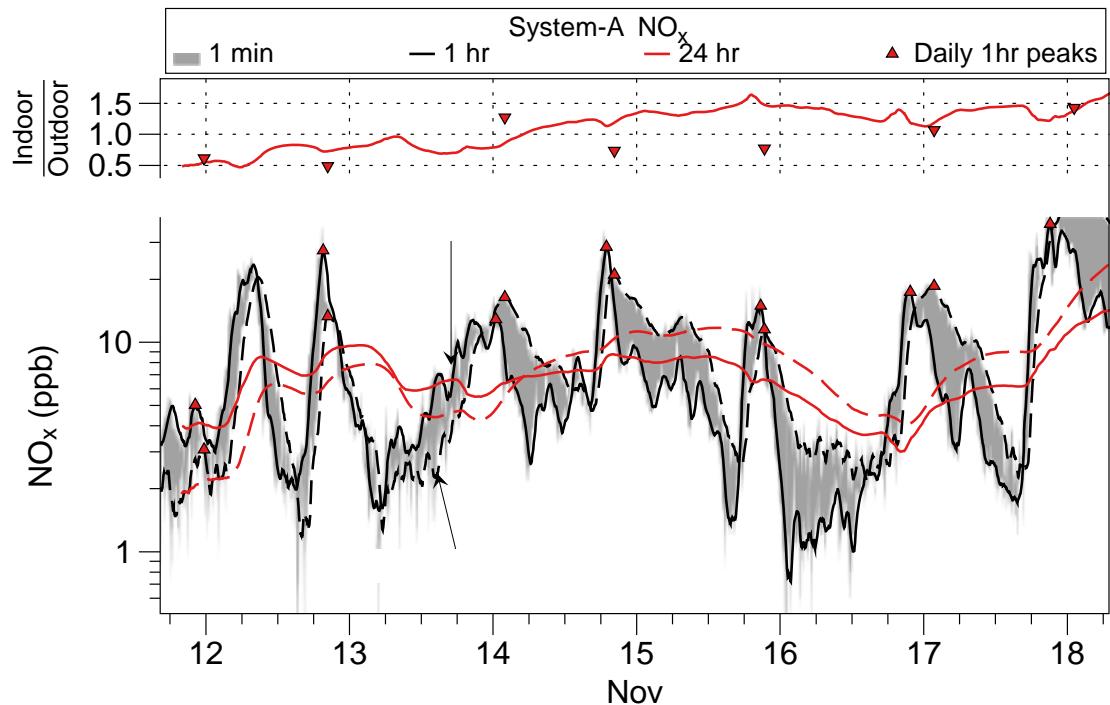


Figure FW-5-A-15. Nitrogen oxides concentrations measured outdoors and indoors during operation of System A, Nov 11-17, 2014. Data collected using API 200A and 200E chemiluminescence analyzers.

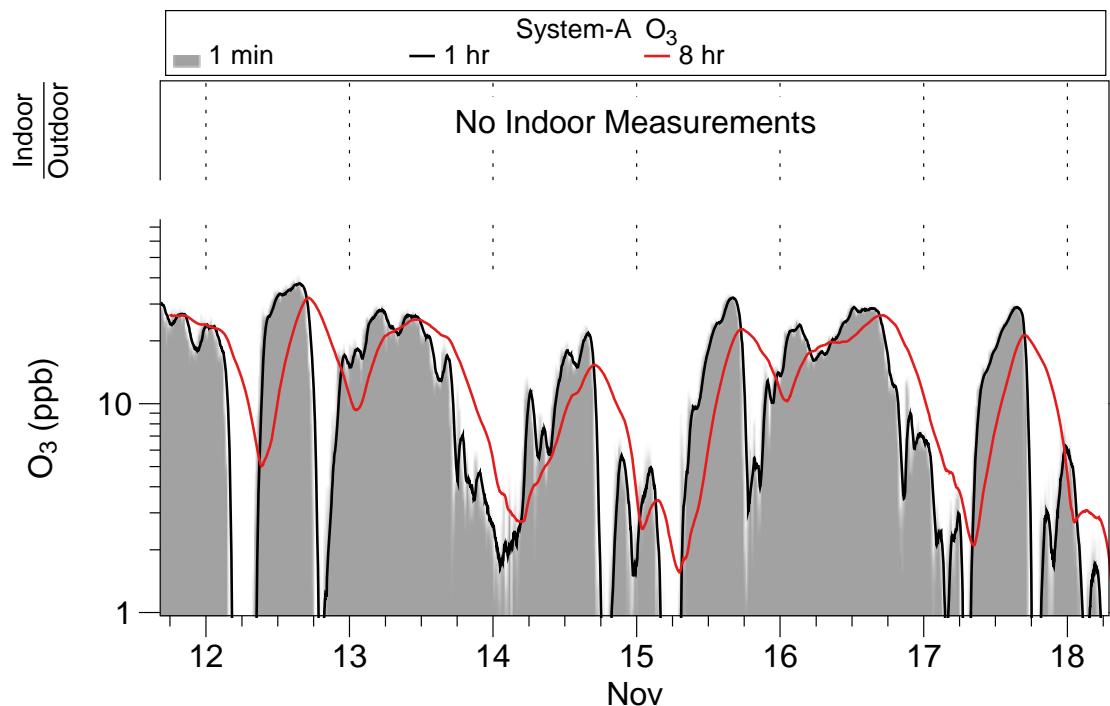


Figure FW-5-A-16. Ozone concentrations measured outdoors and indoors during operation of System A, Nov 11-17, 2014. Data collected using 2B Technologies Model 202 analyzers.

Table FW-5-A-2. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6 nm to 2.5 micron measured using the TSI 3787 CPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.4E+4	1.3E+4	9.6E+3	1.1E+4	7.8E+3	8.3E+3	1.2E+4	1.1E+4	2.2E+3
Outdoor 24 SD	9.1E+3	8.6E+3	5.4E+3	6.7E+3	5.8E+3	5.0E+3	7.6E+3	6.9E+3	1.5E+3
Indoor 24h mean	1.7E+3	3.2E+3	2.6E+3	2.5E+3	2.8E+3	2.8E+3	4.5E+3	2.9E+3	7.8E+2
Indoor 24 SD	7.2E+2	1.2E+3	1.1E+3	1.2E+3	1.2E+3	2.4E+3	2.7E+3	1.5E+3	6.8E+2
24h mean In/Out	0.14	0.16	0.26	0.27	0.28	0.33	0.41	0.27	0.09
Highest 8h Outdoor	1.6E+4	2.4E+4	1.5E+4	1.9E+4	1.3E+4	1.4E+4	2.1E+4	1.8E+4	3.5E+3
Highest 8h Indoor	3.2E+3	3.3E+3	4.1E+3	4.0E+3	4.2E+3	4.7E+3	6.1E+3	4.2E+3	9.1E+2
Highest 8 h In/Out	0.19	0.14	0.26	0.22	0.31	0.33	0.29	0.25	0.06
Highest 1h Outdoor	3.2E+4	3.2E+4	2.1E+4	2.4E+4	2.0E+4	1.9E+4	2.6E+4	2.5E+4	5.0E+3
Highest 1 h Indoor ²	3.2E+3	3.3E+3	4.1E+3	4.0E+3	4.2E+3	4.7E+3	6.1E+3	5.1E+3	1.1E+3
Highest 1h In/Out	0.13	0.13	0.22	0.17	0.28	0.31	0.27	0.22	0.07
Time of highest 1h Outdoor	11/12/14 5:47	11/12/14 6:02	11/13/14 20:23	11/14/14 18:34	11/15/14 20:14	11/16/14 23:08	11/17/14 21:02		
Corresponding highest 1h Indoor	11/12/14 8:23	11/12/14 8:23	11/13/14 22:21	11/14/14 21:30	11/15/14 22:01	11/17/14 0:30	11/18/14 1:02		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 11/11/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-5-A-3. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100 nm to 2.5 micron measured using the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.0E+3	2.1E+3	2.1E+3	1.9E+3	2.4E+3	2.6E+3	3.8E+3	2.3E+3	7.8E+2
Outdoor 24 SD	6.2E+2	1.4E+3	1.4E+3	1.2E+3	1.9E+3	2.4E+3	2.8E+3	1.7E+3	6.9E+2
Indoor 24h mean	3.6E+2	9.6E+2	9.9E+2	8.5E+2	1.1E+3	1.2E+3	1.7E+3	1.0E+3	3.8E+2
Indoor 24 SD	1.0E+2	4.3E+2	4.5E+2	3.4E+2	4.7E+2	8.8E+2	9.3E+2	5.1E+2	2.7E+2
24h mean In/Out	0.39	0.40	0.47	0.47	0.43	0.46	0.50	0.45	0.04
Highest 8h Outdoor	1.2E+3	3.7E+3	3.9E+3	3.5E+3	4.3E+3	5.5E+3	7.1E+3	4.2E+3	1.7E+3
Highest 8h Indoor	6.2E+2	1.5E+3	1.6E+3	1.3E+3	1.7E+3	2.3E+3	2.8E+3	1.7E+3	6.5E+2
Highest 8 h In/Out	0.52	0.41	0.40	0.36	0.39	0.41	0.39	0.41	0.05
Highest 1h Outdoor	2.6E+3	5.3E+3	5.2E+3	4.1E+3	7.1E+3	8.1E+3	1.0E+4	6.1E+3	2.3E+3
Highest 1 h Indoor ²	6.2E+2	1.5E+3	1.6E+3	1.3E+3	1.7E+3	2.3E+3	2.8E+3	2.0E+3	7.7E+2
Highest 1h In/Out	0.31	0.35	0.33	0.33	0.32	0.34	0.32	0.33	0.01
Time of highest 1h Outdoor	11/12/14 6:00	11/12/14 19:23	11/13/14 20:24	11/14/14 20:00	11/15/14 20:15	11/16/14 23:16	11/17/14 23:42		
Corresponding highest 1h Indoor	11/12/14 8:46	11/12/14 22:30	11/14/14 0:20	11/15/14 0:00	11/15/14 22:24	11/17/14 0:54	11/18/14 1:14		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 11/11/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-5-A-4. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6–100 nm based on difference between concentrations measured using the TSI 3787 CPC and the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.3E+4	1.1E+4	7.5E+3	8.7E+3	5.3E+3	5.6E+3	8.4E+3	8.5E+3	2.5E+3
Outdoor 24 SD	8.6E+3	7.7E+3	4.3E+3	5.6E+3	3.9E+3	3.0E+3	5.3E+3	5.5E+3	1.9E+3
Indoor 24h mean	1.3E+3	2.2E+3	1.6E+3	1.7E+3	1.7E+3	1.6E+3	2.8E+3	1.8E+3	4.4E+2
Indoor 24 SD	6.2E+2	8.5E+2	6.8E+2	9.1E+2	7.5E+2	1.8E+3	2.0E+3	1.1E+3	5.3E+2
24h mean In/Out	0.12	0.14	0.21	0.22	0.24	0.28	0.38	0.23	0.08
Highest 8h Outdoor	1.5E+4	2.2E+4	1.2E+4	1.5E+4	1.0E+4	8.9E+3	1.5E+4	1.4E+4	4.0E+3
Highest 8h Indoor	2.6E+3	2.6E+3	2.5E+3	2.8E+3	2.4E+3	2.5E+3	3.4E+3	2.7E+3	3.2E+2
Highest 8 h In/Out	0.17	0.12	0.22	0.19	0.23	0.28	0.24	0.21	0.05
Highest 1h Outdoor	2.9E+4	2.9E+4	1.5E+4	2.1E+4	1.3E+4	1.1E+4	1.9E+4	2.0E+4	6.8E+3
Highest 1 h Indoor ²	2.6E+3	2.6E+3	2.5E+3	2.8E+3	2.4E+3	2.5E+3	3.4E+3	3.3E+3	3.2E+2
Highest 1h In/Out	0.11	0.11	0.19	0.14	0.26	0.28	0.21	0.19	0.06
Time of highest 1h Outdoor	11/12/14 5:47	11/12/14 7:46	11/13/14 20:22	11/14/14 18:32	11/15/14 20:11	11/16/14 20:52	11/17/14 21:03		
Corresponding highest 1h Indoor	11/12/14 8:21	11/12/14 8:21	11/13/14 22:21	11/14/14 20:15	11/15/14 22:01	11/16/14 23:58	11/18/14 1:00		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 11/11/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-5-A-5. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100–300 nm based on difference between concentrations measured using the TSI 3781 CPC with size selector and the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	9.9E+5	2.0E+6	2.0E+6	1.9E+6	2.4E+6	2.6E+6	3.7E+6	2.2E+6	7.7E+5
Outdoor 24 SD	6.1E+5	1.4E+6	1.4E+6	1.2E+6	1.9E+6	2.3E+6	2.8E+6	1.7E+6	6.8E+5
Indoor 24h mean	3.5E+5	9.5E+5	9.5E+5	8.3E+5	1.1E+6	1.2E+6	1.7E+6	1.0E+6	3.8E+5
Indoor 24 SD	1.0E+5	4.3E+5	4.4E+5	3.4E+5	4.6E+5	8.6E+5	9.1E+5	5.1E+5	2.7E+5
24h mean In/Out	0.39	0.39	0.48	0.48	0.43	0.46	0.50	0.45	0.04
Highest 8h Outdoor	1.2E+6	3.6E+6	3.7E+6	3.4E+6	4.3E+6	5.4E+6	7.0E+6	4.1E+6	1.7E+6
Highest 8h Indoor	6.0E+5	1.5E+6	1.5E+6	1.2E+6	1.7E+6	2.2E+6	2.8E+6	1.6E+6	6.4E+5
Highest 8 h In/Out	0.52	0.41	0.41	0.36	0.39	0.41	0.39	0.41	0.05
Highest 1h Outdoor	2.6E+6	5.2E+6	5.1E+6	4.1E+6	7.0E+6	8.0E+6	9.9E+6	6.0E+6	2.3E+6
Highest 1 h Indoor ²	6.0E+5	1.5E+6	1.5E+6	1.2E+6	1.7E+6	2.2E+6	2.8E+6	2.0E+6	7.5E+5
Highest 1h In/Out	0.31	0.35	0.33	0.33	0.31	0.34	0.32	0.33	0.01
Time of highest 1h Outdoor	11/12/14 6:00	11/12/14 19:23	11/13/14 20:24	11/14/14 20:00	11/15/14 20:15	11/16/14 23:16	11/17/14 23:42		
Corresponding highest 1h Indoor	11/12/14 8:46	11/12/14 22:30	11/14/14 0:20	11/15/14 0:00	11/15/14 22:24	11/17/14 0:54	11/18/14 1:14		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 11/11/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-5-A-6. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.3–0.4 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.0E+4	2.8E+4	8.5E+4	4.5E+4	3.9E+4	4.7E+4	4.7E+4	4.3E+4	2.1E+4
Outdoor 24 SD	2.6E+3	1.4E+4	2.4E+4	1.6E+4	2.0E+4	3.8E+4	3.0E+4	2.1E+4	1.1E+4
Indoor 24h mean	5.6E+3	1.3E+4	2.9E+4	1.5E+4	1.9E+4	2.2E+4	2.5E+4	1.8E+4	7.3E+3
Indoor 24 SD	6.3E+2	4.7E+3	1.0E+4	2.1E+3	4.6E+3	1.5E+4	1.3E+4	7.3E+3	5.3E+3
24h mean In/Out	0.53	0.51	0.36	0.34	0.42	0.51	0.52	0.46	0.07
Highest 8h Outdoor	1.1E+4	4.1E+4	1.1E+5	8.5E+4	5.3E+4	9.5E+4	8.1E+4	6.7E+4	3.1E+4
Highest 8h Indoor	5.3E+3	1.8E+4	4.0E+4	3.7E+4	2.4E+4	4.2E+4	4.2E+4	3.0E+4	1.3E+4
Highest 8 h In/Out	0.46	0.43	0.38	0.43	0.46	0.44	0.52	0.45	0.04
Highest 1h Outdoor	1.5E+4	5.6E+4	1.2E+5	8.0E+4	7.6E+4	1.2E+5	9.9E+4	8.0E+4	3.4E+4
Highest 1 h Indoor ²	5.3E+3	1.8E+4	4.0E+4	3.7E+4	2.4E+4	4.2E+4	4.2E+4	3.0E+4	1.6E+4
Highest 1h In/Out	0.53	0.31	0.38	0.19	0.38	0.42	0.46	0.38	0.10
Time of highest 1h Outdoor	11/12/14 5:08	11/13/14 3:41	11/13/14 21:25	11/14/14 14:12	11/15/14 20:13	11/16/14 21:52	11/17/14 23:44		
Corresponding highest 1h Indoor	11/12/14 9:08	11/13/14 4:05	11/13/14 23:45	11/14/14 14:30	11/15/14 22:27	11/17/14 1:01	11/18/14 1:36		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 11/11/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-5-A-7. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.4–0.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	2.7E+3	5.7E+3	2.9E+4	9.2E+3	7.9E+3	1.0E+4	8.5E+3	1.0E+4	7.8E+3
Outdoor 24 SD	5.7E+2	3.4E+3	1.2E+4	4.7E+3	4.8E+3	1.0E+4	6.1E+3	5.9E+3	3.6E+3
Indoor 24h mean	1.4E+3	2.3E+3	4.6E+3	2.2E+3	3.3E+3	3.5E+3	3.9E+3	3.0E+3	1.0E+3
Indoor 24 SD	1.9E+2	6.2E+2	1.7E+3	3.9E+2	8.4E+2	2.6E+3	2.2E+3	1.2E+3	8.7E+2
24h mean In/Out	0.49	0.50	0.22	0.19	0.35	0.42	0.41	0.37	0.12
Highest 8h Outdoor	2.9E+3	8.8E+3	3.9E+4	2.5E+4	1.1E+4	2.2E+4	1.5E+4	1.8E+4	1.1E+4
Highest 8h Indoor	1.7E+3	2.9E+3	6.5E+3	5.7E+3	3.9E+3	6.9E+3	6.8E+3	4.9E+3	1.9E+3
Highest 8 h In/Out	0.59	0.33	0.17	0.22	0.34	0.31	0.44	0.34	0.13
Highest 1h Outdoor	3.6E+3	1.4E+4	4.6E+4	1.9E+4	1.6E+4	3.4E+4	2.0E+4	2.2E+4	1.3E+4
Highest 1 h Indoor ²	1.7E+3	2.9E+3	6.5E+3	5.7E+3	3.9E+3	6.9E+3	6.8E+3	4.8E+3	2.5E+3
Highest 1h In/Out	0.52	0.21	0.16	0.11	0.26	0.24	0.36	0.27	0.13
Time of highest 1h Outdoor	11/12/14 5:26	11/13/14 3:43	11/13/14 21:44	11/14/14 14:09	11/15/14 7:50	11/16/14 21:47	11/17/14 23:44		
Corresponding highest 1h Indoor	11/12/14 8:57	11/13/14 3:45	11/13/14 23:15	11/14/14 18:09	11/15/14 10:07	11/17/14 0:55	11/18/14 1:29		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 11/11/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-5-A-8. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.5–0.7 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	3.4E+3	4.3E+3	1.6E+4	4.4E+3	4.9E+3	5.4E+3	4.7E+3	6.2E+3	4.1E+3
Outdoor 24 SD	4.6E+2	1.4E+3	8.9E+3	1.3E+3	3.2E+3	6.1E+3	3.4E+3	3.5E+3	2.8E+3
Indoor 24h mean	1.5E+3	1.8E+3	2.0E+3	1.2E+3	2.1E+3	1.9E+3	2.0E+3	1.8E+3	3.0E+2
Indoor 24 SD	2.0E+2	2.9E+2	7.2E+2	3.8E+2	6.9E+2	1.4E+3	1.2E+3	7.0E+2	4.3E+2
24h mean In/Out	0.42	0.45	0.21	0.18	0.37	0.42	0.39	0.35	0.10
Highest 8h Outdoor	3.6E+3	5.3E+3	2.4E+4	1.2E+4	7.8E+3	1.2E+4	8.6E+3	1.0E+4	6.1E+3
Highest 8h Indoor	1.8E+3	2.0E+3	2.8E+3	2.3E+3	2.8E+3	3.7E+3	3.7E+3	2.7E+3	7.0E+2
Highest 8 h In/Out	0.49	0.37	0.12	0.19	0.36	0.30	0.42	0.32	0.12
Highest 1h Outdoor	4.2E+3	7.8E+3	3.0E+4	7.6E+3	1.1E+4	2.4E+4	1.2E+4	1.4E+4	8.7E+3
Highest 1 h Indoor ²	1.8E+3	2.0E+3	2.8E+3	2.3E+3	2.8E+3	3.7E+3	3.7E+3	2.9E+3	1.2E+3
Highest 1h In/Out	0.45	0.24	0.11	0.14	0.29	0.20	0.33	0.25	0.11
Time of highest 1h Outdoor	11/12/14 5:27	11/13/14 3:40	11/13/14 21:44	11/14/14 14:03	11/15/14 9:29	11/16/14 21:47	11/17/14 23:35		
Corresponding highest 1h Indoor	11/12/14 9:02	11/13/14 3:40	11/13/14 22:28	11/14/14 18:03	11/15/14 10:13	11/16/14 22:06	11/18/14 1:20		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 11/11/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-5-A-9. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.7–1.0 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.6E+3	1.5E+3	1.9E+3	8.7E+2	1.2E+3	9.6E+2	9.0E+2	1.3E+3	3.6E+2
Outdoor 24 SD	1.2E+2	3.3E+2	1.3E+3	3.8E+2	8.9E+2	1.2E+3	6.2E+2	6.9E+2	4.1E+2
Indoor 24h mean	5.7E+2	5.6E+2	2.8E+2	2.9E+2	4.9E+2	3.3E+2	3.5E+2	4.1E+2	1.2E+2
Indoor 24 SD	6.1E+1	8.4E+1	8.9E+1	1.4E+2	1.9E+2	2.5E+2	2.0E+2	1.5E+2	6.6E+1
24h mean In/Out	0.35	0.36	0.24	0.23	0.38	0.38	0.38	0.33	0.06
Highest 8h Outdoor	1.6E+3	1.8E+3	3.0E+3	1.3E+3	2.0E+3	2.1E+3	1.6E+3	1.9E+3	5.0E+2
Highest 8h Indoor	6.3E+2	6.2E+2	3.8E+2	4.5E+2	6.7E+2	6.4E+2	6.2E+2	5.7E+2	1.0E+2
Highest 8 h In/Out	0.39	0.35	0.13	0.36	0.34	0.30	0.38	0.32	0.08
Highest 1h Outdoor	1.7E+3	2.0E+3	3.7E+3	1.3E+3	3.6E+3	5.1E+3	2.3E+3	2.8E+3	1.2E+3
Highest 1 h Indoor ²	6.3E+2	6.2E+2	3.8E+2	4.5E+2	6.7E+2	6.4E+2	6.2E+2	6.5E+2	1.9E+2
Highest 1h In/Out	0.37	0.33	0.08	0.38	0.24	0.18	0.29	0.27	0.10
Time of highest 1h Outdoor	11/12/14 5:32	11/12/14 20:12	11/13/14 14:21	11/14/14 23:55	11/15/14 10:07	11/16/14 21:47	11/17/14 23:31		
Corresponding highest 1h Indoor	11/12/14 6:06	11/12/14 21:36	11/13/14 14:42	11/15/14 2:00	11/15/14 10:15	11/16/14 22:05	11/18/14 1:21		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 11/11/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-5-A-10. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 1.0–2.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	9.6E+2	1.1E+3	4.9E+2	5.0E+2	8.4E+2	4.5E+2	5.1E+2	6.9E+2	2.4E+2
Outdoor 24 SD	8.1E+1	3.6E+2	3.6E+2	2.9E+2	6.8E+2	4.9E+2	3.0E+2	3.7E+2	1.7E+2
Indoor 24h mean	3.1E+2	3.0E+2	1.2E+2	1.5E+2	2.4E+2	1.4E+2	1.6E+2	2.0E+2	7.4E+1
Indoor 24 SD	1.4E+1	4.9E+1	3.9E+1	7.8E+1	1.0E+2	9.3E+1	8.8E+1	6.6E+1	3.0E+1
24h mean In/Out	0.31	0.30	0.27	0.27	0.31	0.29	0.32	0.29	0.02
Highest 8h Outdoor	1.0E+3	1.3E+3	8.8E+2	7.9E+2	1.5E+3	9.2E+2	8.4E+2	1.0E+3	2.6E+2
Highest 8h Indoor	3.1E+2	3.4E+2	1.5E+2	2.0E+2	3.3E+2	2.5E+2	2.7E+2	2.6E+2	6.4E+1
Highest 8 h In/Out	0.31	0.25	0.17	0.25	0.21	0.27	0.32	0.26	0.05
Highest 1h Outdoor	1.1E+3	1.5E+3	1.2E+3	9.4E+2	2.6E+3	2.1E+3	1.2E+3	1.5E+3	5.6E+2
Highest 1 h Indoor ²	3.1E+2	3.4E+2	1.5E+2	2.0E+2	3.3E+2	2.5E+2	2.7E+2	3.0E+2	8.7E+1
Highest 1h In/Out	0.30	0.24	0.13	0.22	0.17	0.17	0.26	0.21	0.06
Time of highest 1h Outdoor	11/11/14 21:33	11/12/14 19:07	11/13/14 13:59	11/14/14 18:54	11/15/14 10:20	11/16/14 21:45	11/17/14 23:24		
Corresponding highest 1h Indoor	11/11/14 22:27	11/12/14 21:49	11/13/14 14:32	11/14/14 22:53	11/15/14 10:24	11/16/14 22:06	11/18/14 1:15		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 11/11/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-5-A-11. Summary statistics for estimated PM_{2.5} concentrations ($\mu\text{g m}^{-3}$) calculated from particle number concentrations resolved by size from 6 nm to 2.5 microns (as reported in Tables FW-5-A-2 to FW-5-A-9) and resulting indoor/outdoor ratios.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.4E+1	2.0E+1	2.4E+1	1.6E+1	2.0E+1	1.9E+1	2.3E+1	1.9E+1	3.3E+0
Outdoor 24 SD	3.6E+0	8.0E+0	1.1E+1	6.3E+0	1.2E+1	1.6E+1	1.6E+1	1.1E+1	4.5E+0
Indoor 24h mean	4.6E+0	7.4E+0	7.1E+0	5.8E+0	8.0E+0	7.5E+0	1.0E+1	7.2E+0	1.6E+0
Indoor 24 SD	6.2E-1	2.2E+0	2.7E+0	2.1E+0	2.4E+0	5.4E+0	5.3E+0	3.0E+0	1.6E+0
24h mean In/Out	0.33	0.34	0.33	0.33	0.38	0.42	0.45	0.37	0.05
Highest 8h Outdoor	1.5E+1	2.8E+1	3.5E+1	2.4E+1	2.8E+1	3.8E+1	4.2E+1	3.0E+1	8.5E+0
Highest 8h Indoor	6.0E+0	1.0E+1	1.1E+1	8.2E+0	1.0E+1	1.4E+1	1.7E+1	1.1E+1	3.3E+0
Highest 8 h In/Out	0.40	0.36	0.30	0.34	0.37	0.37	0.40	0.36	0.03
Highest 1h Outdoor	2.2E+1	3.7E+1	4.5E+1	2.8E+1	4.4E+1	5.8E+1	5.8E+1	4.2E+1	1.3E+1
Highest 1 h Indoor ²	6.0E+0	1.0E+1	1.1E+1	8.2E+0	1.0E+1	1.4E+1	1.7E+1	1.3E+1	4.0E+0
Highest 1h In/Out	0.31	0.32	0.26	0.30	0.31	0.30	0.32	0.30	0.02
Time of highest 1h Outdoor	11/12/14 5:53	11/12/14 19:23	11/13/14 21:28	11/14/14 19:59	11/15/14 20:13	11/16/14 21:48	11/17/14 23:41		
Corresponding highest 1h Indoor	11/12/14 8:54	11/12/14 22:29	11/13/14 22:33	11/14/14 23:59	11/15/14 22:02	11/17/14 0:54	11/18/14 1:15		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 11/11/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-5-A-12. Summary statistics for concentrations of PM_{2.5} ($\mu\text{g m}^{-3}$) and indoor /outdoor ratios from measurements reported by TSI DustTrak II.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	9.4E-3	1.9E-2	5.3E-2	2.2E-2	2.5E-2	3.5E-2	3.4E-2	2.8E-2	1.3E-2
Outdoor 24 SD	2.4E-3	7.8E-3	2.6E-2	7.6E-3	1.4E-2	3.5E-2	2.6E-2	1.7E-2	1.1E-2
Indoor 24h mean	3.0E-3	7.3E-3	1.1E-2	7.2E-3	9.1E-3	1.2E-2	1.4E-2	9.1E-3	3.5E-3
Indoor 24 SD	1.2E-3	2.9E-3	6.1E-3	1.8E-3	3.1E-3	9.8E-3	8.9E-3	4.8E-3	3.2E-3
24h mean In/Out	0.25	0.36	0.24	0.27	0.33	0.39	0.41	0.32	0.06
Highest 8h Outdoor	1.0E-2	2.7E-2	7.9E-2	4.8E-2	3.5E-2	7.6E-2	6.4E-2	4.8E-2	2.4E-2
Highest 8h Indoor	4.8E-3	1.1E-2	1.8E-2	1.7E-2	1.3E-2	2.5E-2	2.6E-2	1.6E-2	7.1E-3
Highest 8 h In/Out	0.46	0.40	0.22	0.35	0.37	0.33	0.41	0.36	0.07
Highest 1h Outdoor	1.3E-2	3.4E-2	1.0E-1	3.9E-2	5.6E-2	1.3E-1	8.7E-2	6.5E-2	3.7E-2
Highest 1 h Indoor ²	4.8E-3	1.1E-2	1.8E-2	1.7E-2	1.3E-2	2.5E-2	2.6E-2	1.8E-2	9.2E-3
Highest 1h In/Out	0.39	0.38	0.21	0.21	0.27	0.24	0.34	0.29	0.07
Time of highest 1h Outdoor	11/12/14 5:33	11/12/14 20:02	11/13/14 21:31	11/14/14 14:11	11/15/14 20:13	11/16/14 21:49	11/17/14 23:44		
Corresponding highest 1h Indoor	11/12/14 9:15	11/12/14 22:13	11/14/14 0:59	11/14/14 18:11	11/15/14 22:24	11/17/14 0:59	11/18/14 0:59		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 11/11/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-5-A-13. Daily¹ summary statistics for concentrations (nanograms m^{-3}) and indoor /outdoor ratios of aerosol black carbon measured using the Aethalometer AE22.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	4.3E+2	7.5E+2	9.3E+2	7.9E+2	6.8E+2	9.6E+2	1.7E+3	8.9E+2	3.6E+2
Outdoor 24 SD	3.0E+2	6.1E+2	5.1E+2	4.2E+2	5.6E+2	1.4E+3	1.5E+3	7.5E+2	4.4E+2
Indoor 24h mean	2.3E+2	5.0E+2	5.2E+2	5.1E+2	4.8E+2	5.6E+2	9.8E+2	5.4E+2	2.1E+2
Indoor 24 SD	9.0E+1	2.0E+2	2.5E+2	1.5E+2	1.8E+2	5.0E+2	7.6E+2	3.0E+2	2.2E+2
24h mean In/Out	0.59	0.61	0.58	0.62	0.65	0.66	0.61	0.62	0.03
Highest 8h Outdoor	5.0E+2	1.2E+3	1.5E+3	1.3E+3	1.2E+3	2.2E+3	3.4E+3	1.6E+3	8.7E+2
Highest 8h Indoor	4.6E+2	6.8E+2	8.3E+2	7.1E+2	6.5E+2	1.2E+3	1.9E+3	9.3E+2	4.7E+2
Highest 8 h In/Out	0.91	0.57	0.54	0.56	0.56	0.54	0.57	0.61	0.12
Highest 1h Outdoor	1.2E+3	2.7E+3	2.3E+3	1.9E+3	2.1E+3	5.9E+3	4.3E+3	2.9E+3	1.5E+3
Highest 1 h Indoor ²	4.6E+2	6.8E+2	8.3E+2	7.1E+2	6.5E+2	1.2E+3	1.9E+3	1.1E+3	5.6E+2
Highest 1h In/Out	0.54	0.33	0.41	0.42	0.41	0.24	0.56	0.42	0.10
Time of highest 1h Outdoor	11/12/14 6:00	11/12/14 19:36	11/13/14 21:45	11/14/14 19:06	11/15/14 20:21	11/16/14 21:51	11/17/14 23:15		
Corresponding highest 1h Indoor	11/12/14 8:12	11/12/14 21:33	11/13/14 22:30	11/14/14 20:48	11/15/14 21:45	11/17/14 0:42	11/18/14 1:21		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 11/11/2014 20:30, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Appendix FW-6-B. Results for System B, November 18-25, 2014.

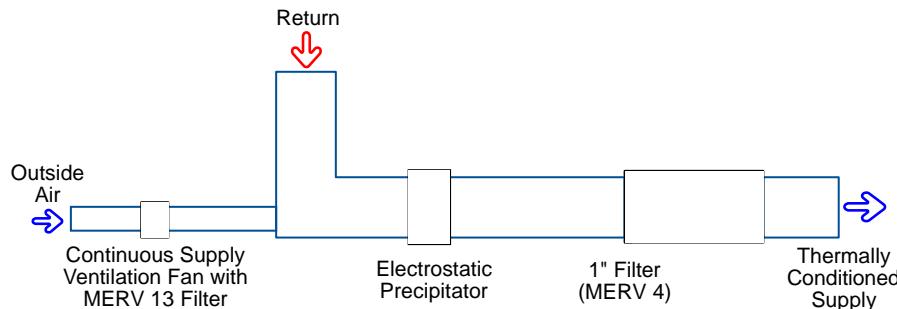


Table FW-6-B-1. Description of **System B** component characteristics during the period of **November 18-25, 2014**

System Parameter	Description or Measured Value
Heating	75,000 BTU/h, 80% eff., gas furnace, 1-stage burner
Cooling	3 ton, SEER13 air conditioner
Thermal distribution	Central fan with PSC motor: 1198 cfm for cooling, 1073 cfm for heating
Ventilation	Supply fan discharging into the return plenum. Set to 38 cfm continuous
Filtration	Electrostatic precipitator (ESP, often called electronic air cleaner) Honeywell F300A2025/U installed inside the FAU cabinet. A MERV13, 2" (AirGaurd DPgreen13) installed where the continuous supply air discharges into the return plenum.
Recirculation blower schedule	As required for thermal conditioning, no fan cycler.
VOC removal system	None

Notes about this monitoring period

We lost one of the CPC 3781 instruments near the beginning of the operational period. The CPC 3781 indoor / outdoor data stream was constructed from the single remaining instrument. The DustTrak had periods with communication dropouts. All of the other instruments were functioning normally.

The 24 h running statistics in the figures starts at 11/18/2014 22:00.

There was significant fog on the following days 11/21/2014, 11/23/2014, and 11/24/2014.

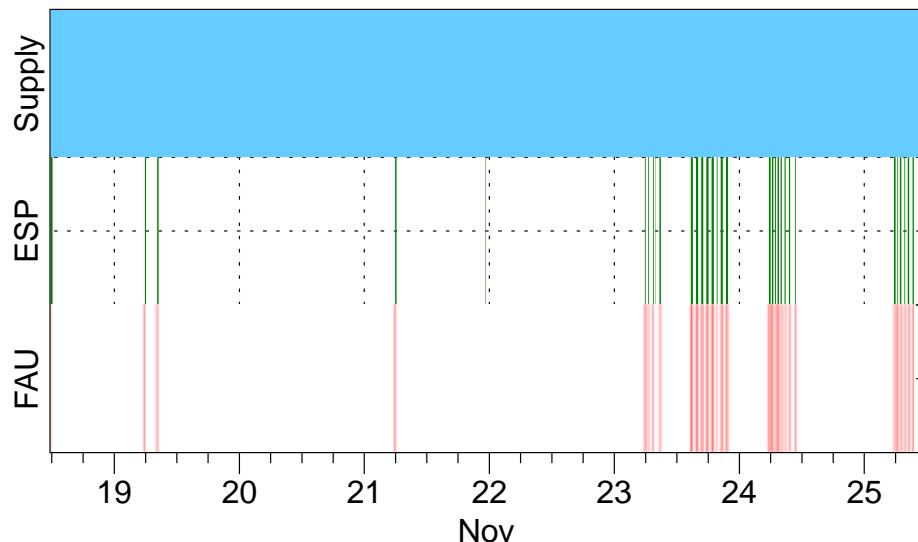


Figure FW-6-B-1. Operation of mechanical systems: Supply fan; ESP filter; fan on central forced air unit (FAU).

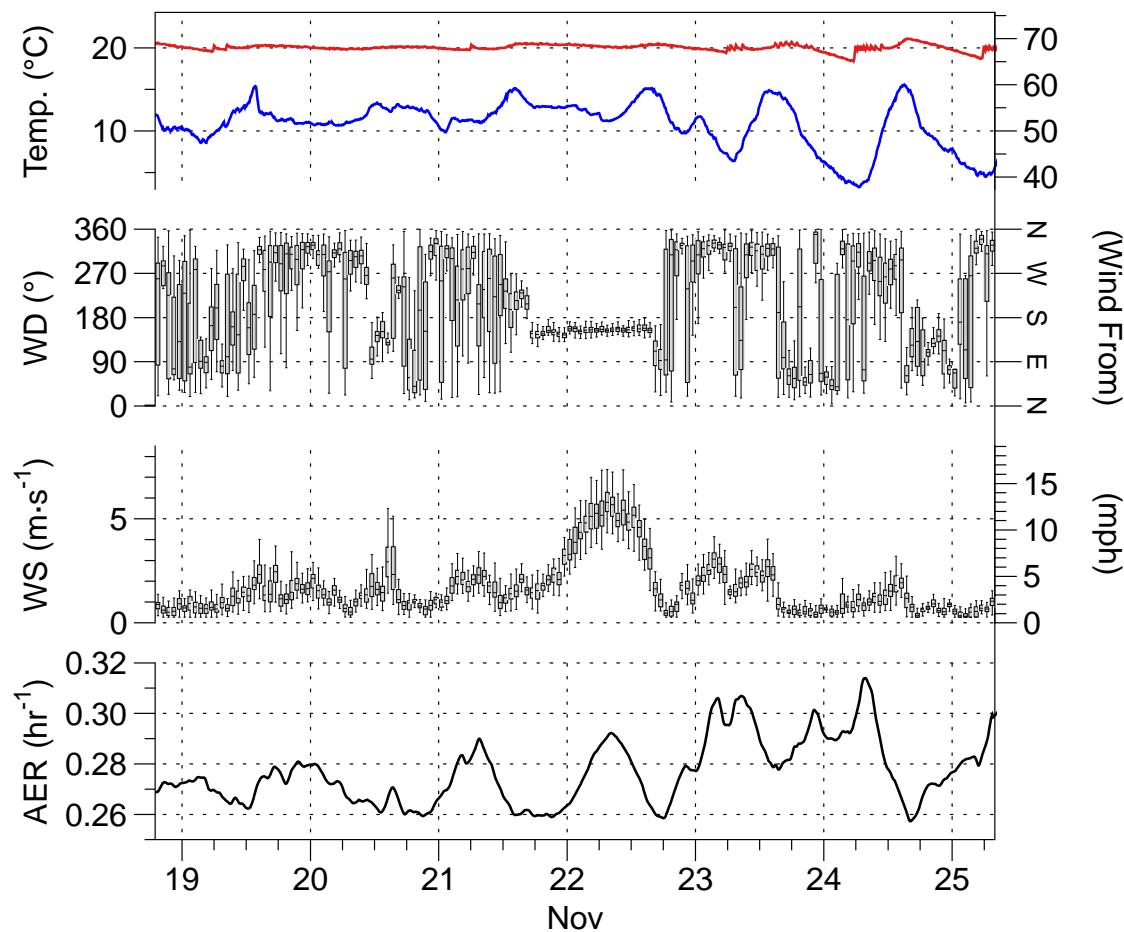


Figure FW-6-B-2. Environmental parameters measured during operation of System B, Nov 18-25, 2014. From top to bottom: indoor (red) and outdoor (blue) temperatures, wind direction (WD) in units of degrees from North, wind speed (WS), and air exchange rate (AER). For WD and WS, the box for each hour shows the 25th, 50th and 75th percentiles of the measured values and whiskers extend 1.5X the interquartile range (75th-25th percentile values) above the 75th and below the 25th percentile values.

Guide to plots of pollutant concentration time series and indoor / outdoor (I/O) ratios

The bottom section of each plot shows outdoor and indoor time series using the resolution of data collection: 3-min for black carbon and 1-min for all other parameters. The top and bottom of grey band are LOESS-smoothed, 1-min (or 3-min for black carbon) time-series. Also shown are time series with 1h and 24h time averaging for most pollutants and 1h and 8h average for ozone. Triangles in bottom of plot indicate the highest 1h outdoor and corresponding highest 1h indoor average during each day. The top section of each plot shows the ratio of indoor to outdoor running 24h mean values (8h for ozone) and the ratios of highest 1h indoor to corresponding highest 1h outdoor concentration each day.

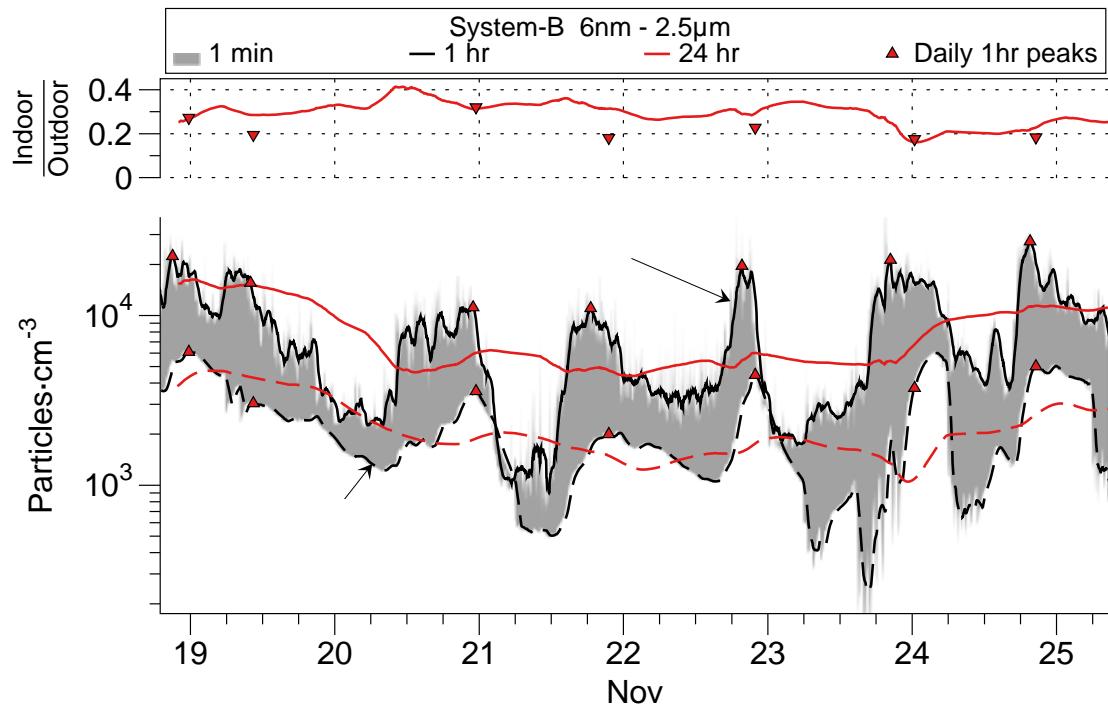


Figure FW-6-B-3. Number concentrations of 6 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of System B, Nov 18-25, 2014. Data collected using TSI 3787 CPCs.

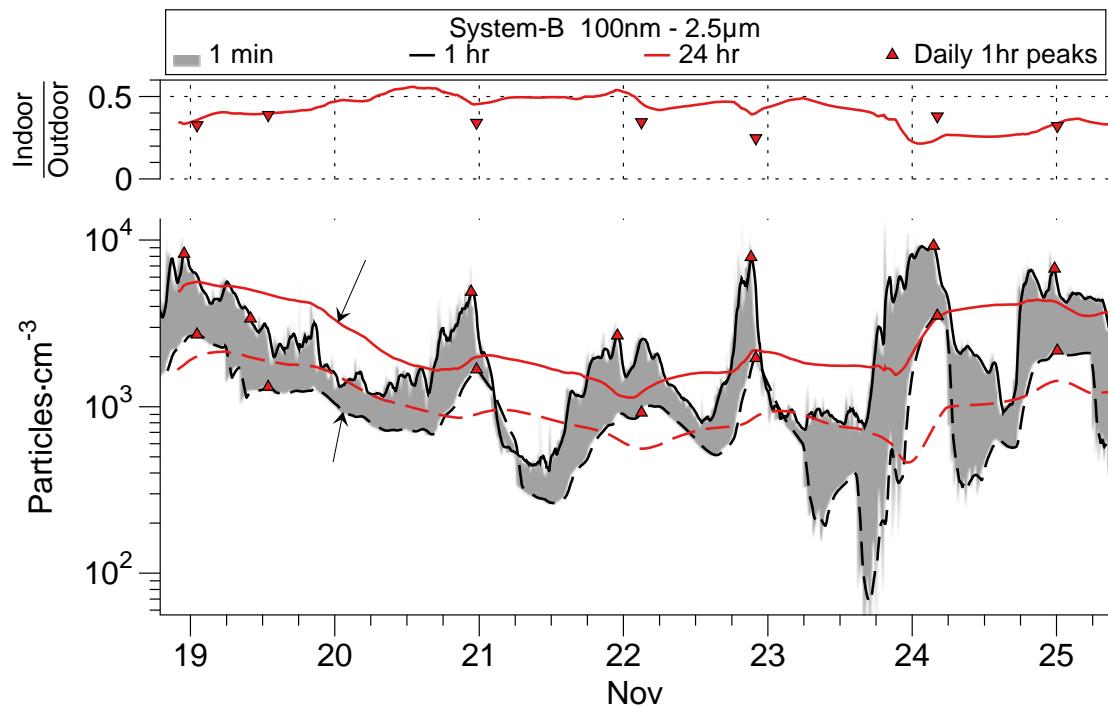


Figure FW-6-B-4. Number concentrations of 100 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of System B, Nov 18-25, 2014. Data collected using TSI 3781 CPCs outfitted with screens to exclude particles smaller than 100 nm. Refer to “Guide” before Figure FW-6-B-3.

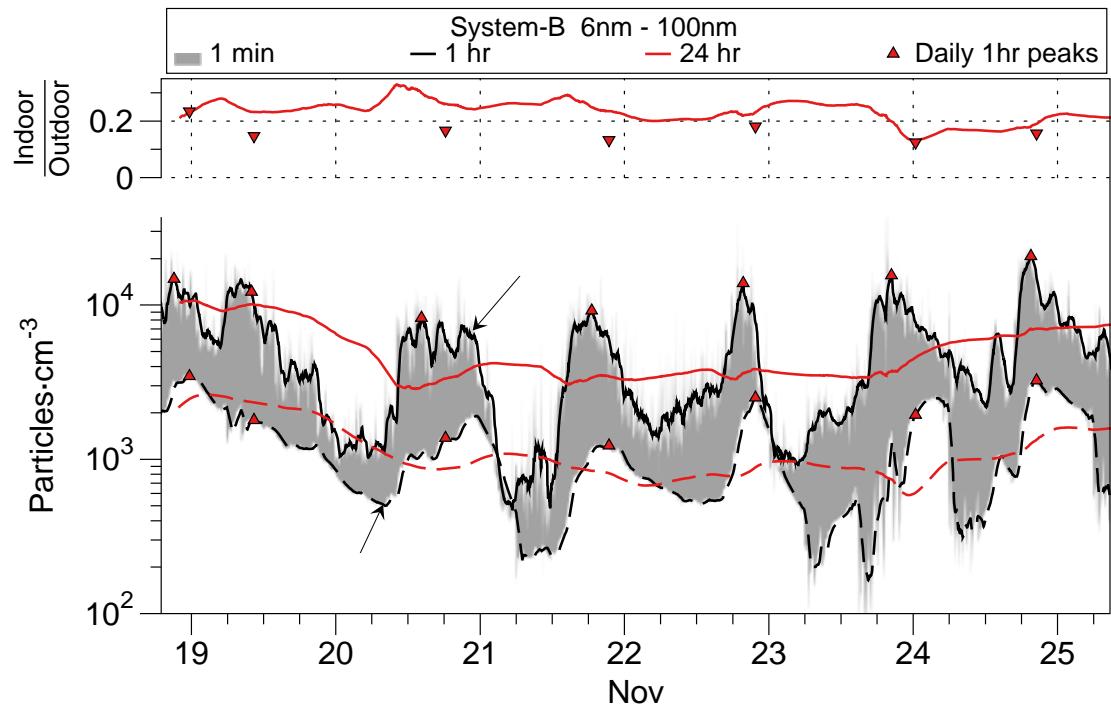


Figure FW-6-B-5. Number concentrations of 6–100 nm diameter particles measured outdoors and indoors during operation of System B, Nov 18–25, 2014. Data obtained as the difference between time series shown in prior two figures. Refer to “Guide” before Figure FW-6-B-3.

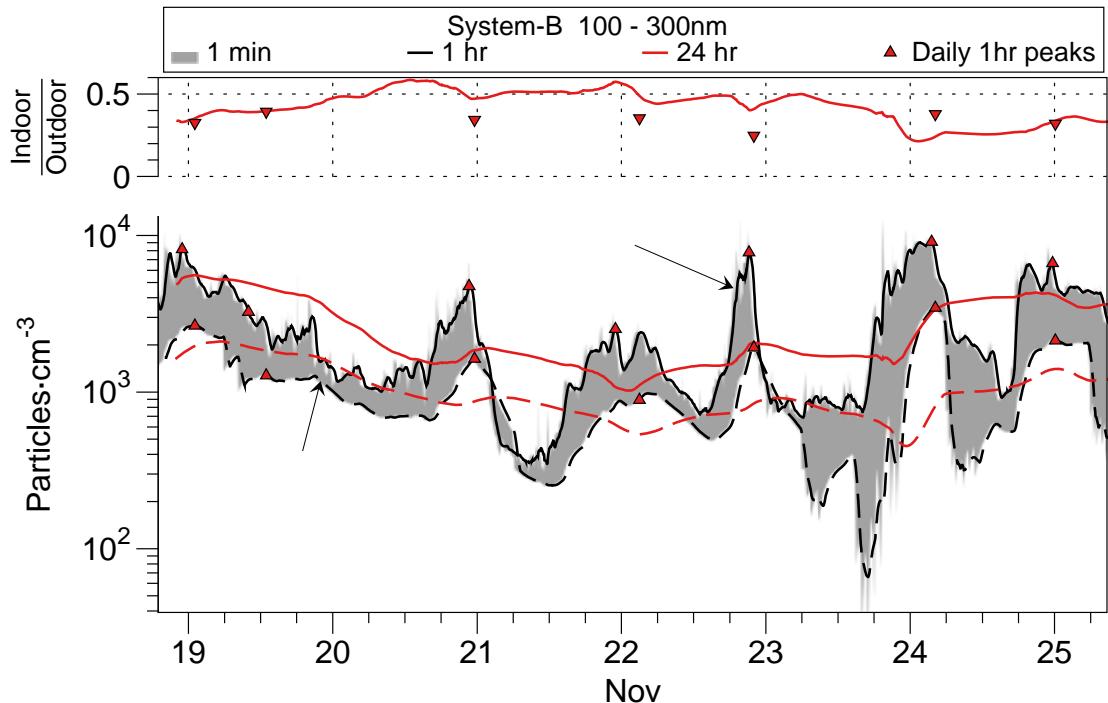


Figure FW-6-B-6. Number concentrations of 100–300 nm diameter particles measured outdoors and indoors during operation of System B, Nov 18–25, 2014. Data obtained as the difference between the TSI 3781 CPC with size selector and the MetOne BT637S OPC. Refer to “Guide” before Figure FW-6-B-3.

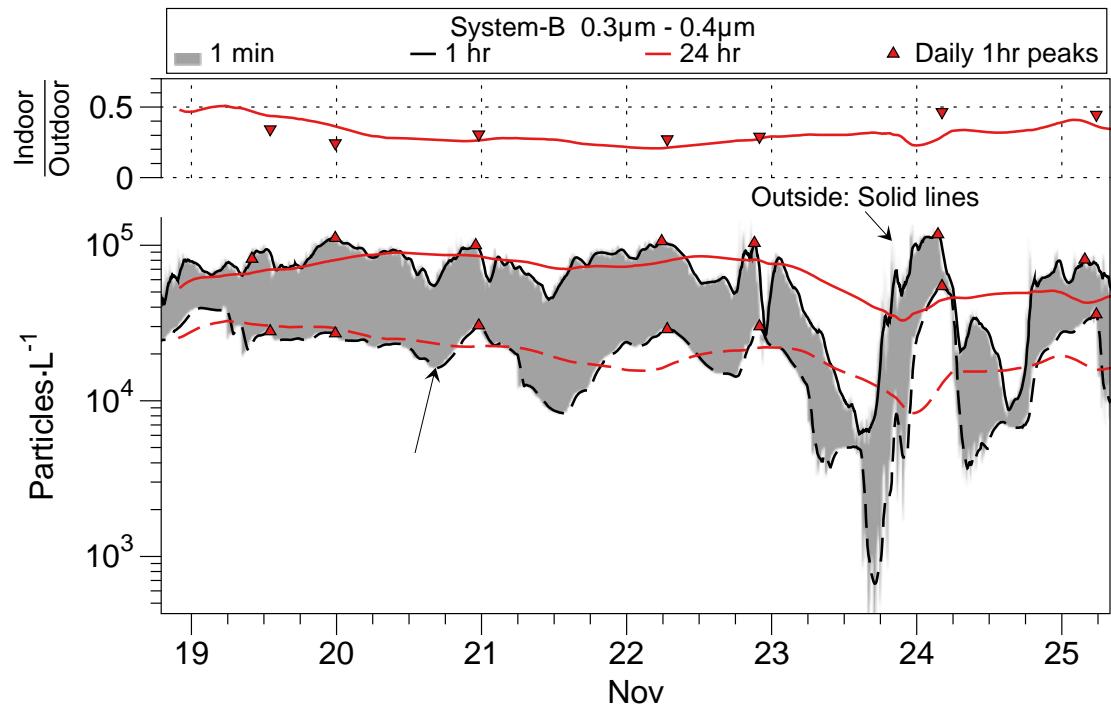


Figure FW-6-B-7. Number concentrations of 0.3–0.4 μm diameter particles measured outdoors and indoors during operation of System B, Nov 18–25, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-6-B-3.

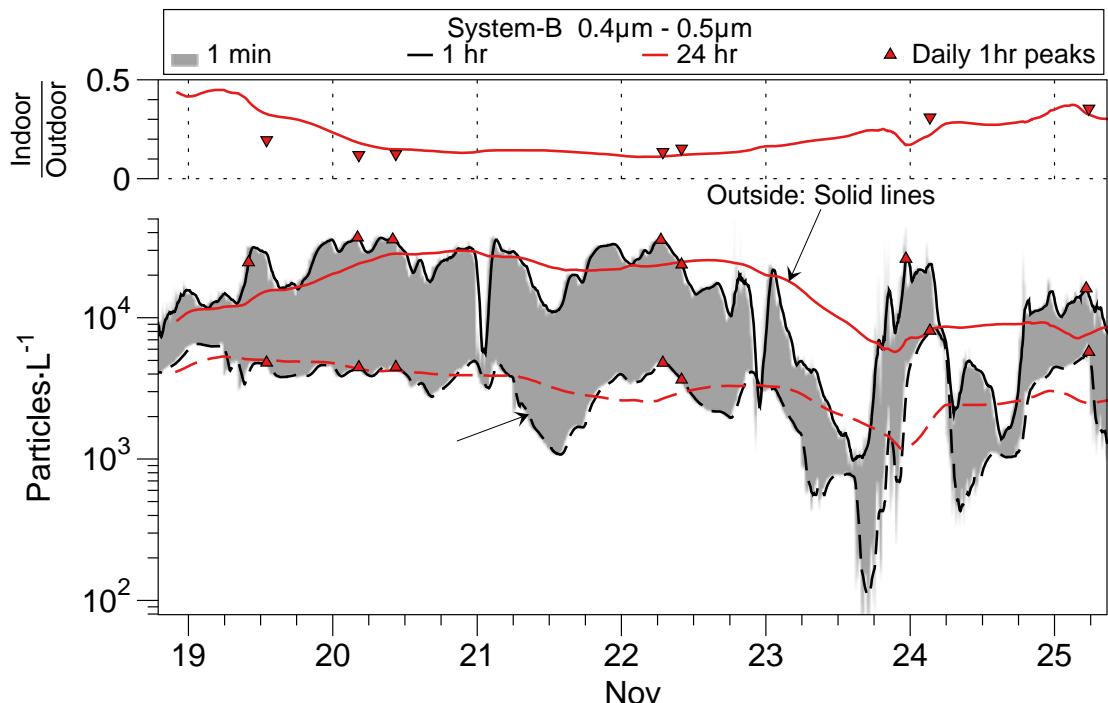


Figure FW-6-B-8. Number concentrations of 0.4–0.5 μm diameter particles measured outdoors and indoors during operation of System B, Nov 18–25, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-6-B-3.

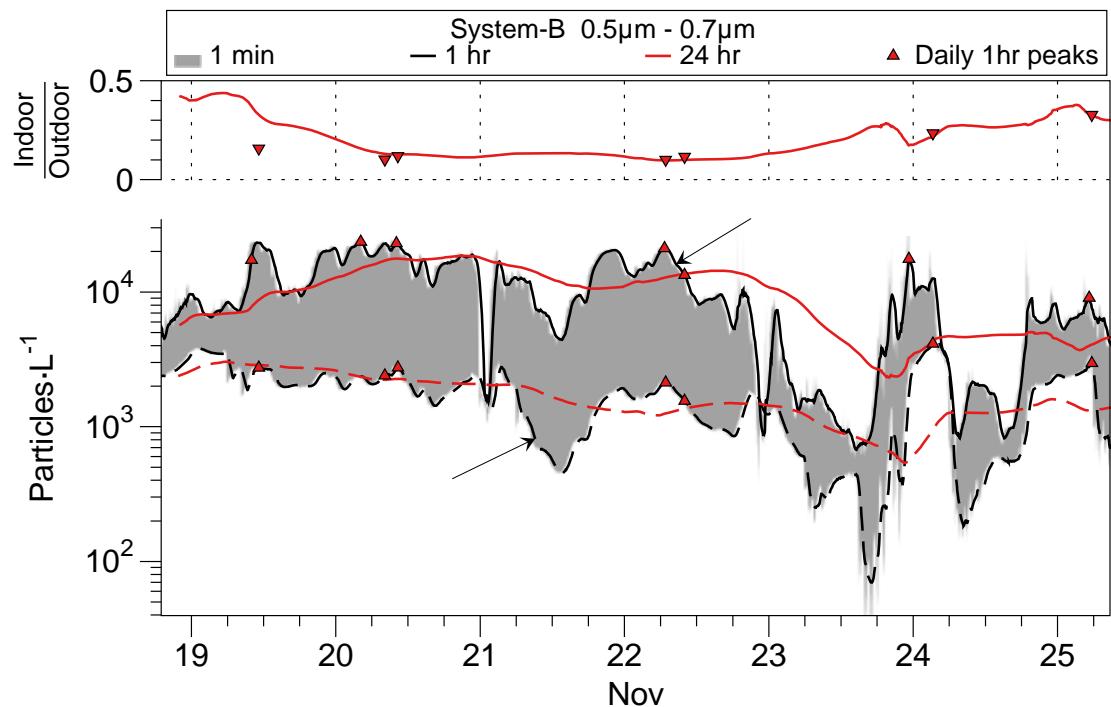


Figure FW-6-B-9. Number concentrations of 0.5–0.7 μm diameter particles measured outdoors and indoors during operation of System B, Nov 18–25, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-6-B-3.

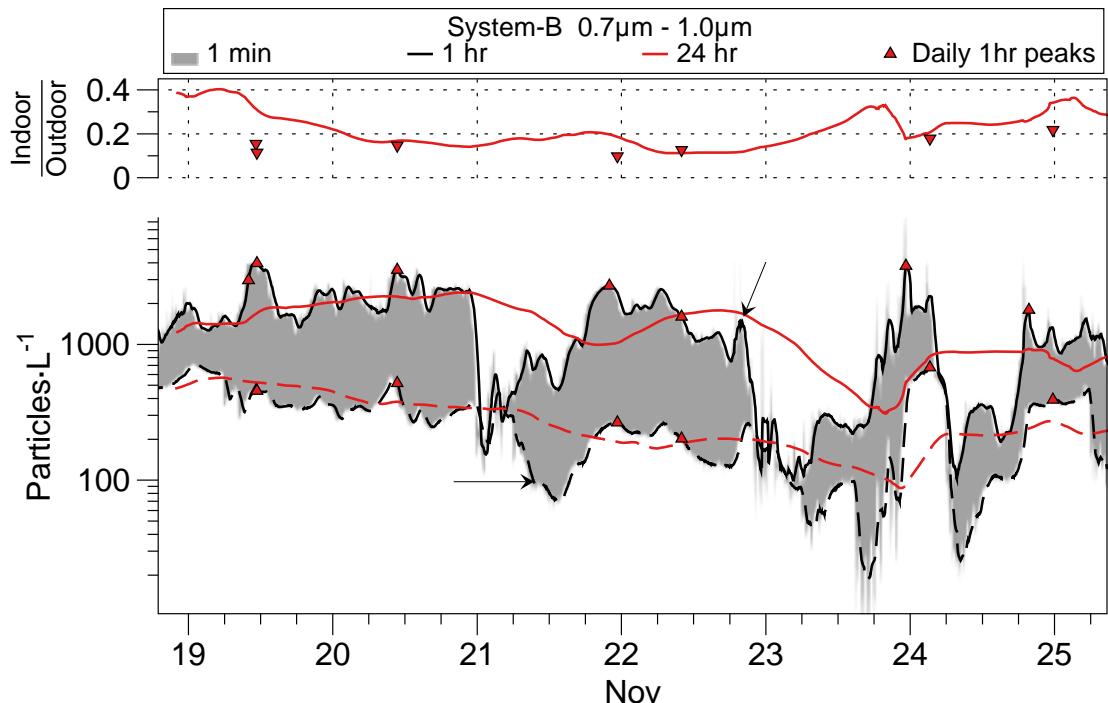


Figure FW-6-B-10. Number concentrations of 0.7–1.0 μm diameter particles measured outdoors and indoors during operation of System B, Nov 18–25, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-6-B-3.

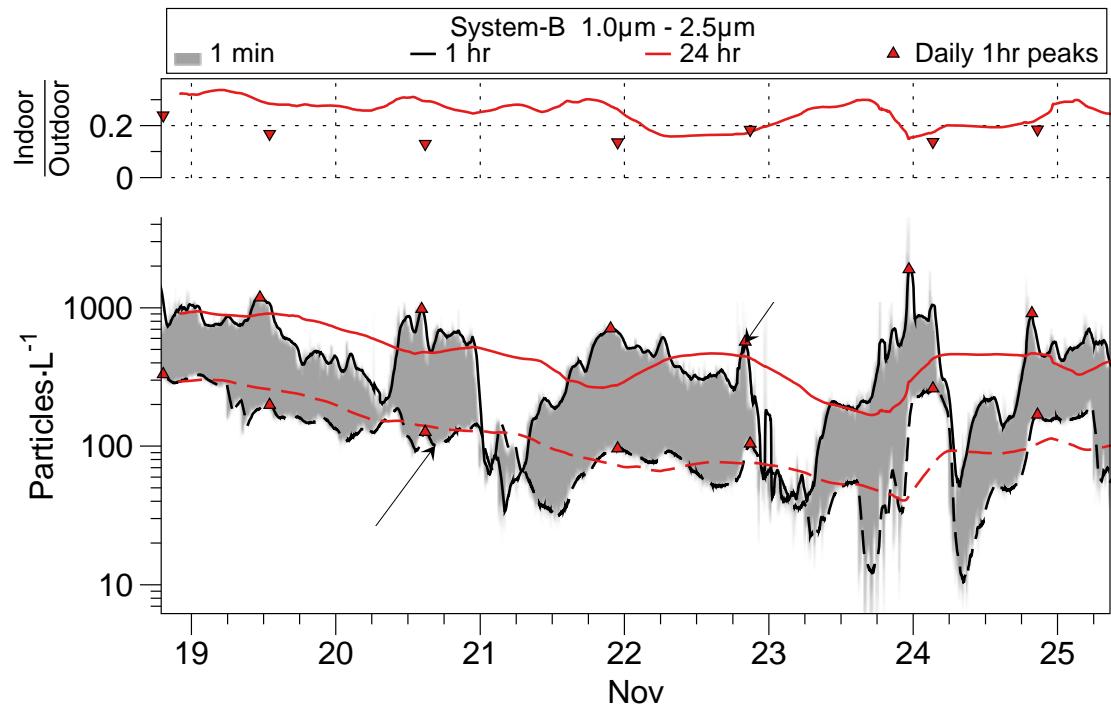


Figure FW-6-B-11. Number concentrations of 1.0–2.5 μm diameter particles measured outdoors and indoors during operation of System B, Nov 18-25, 2014. Data collected using MetOne BT637S particle counters. Refer to Figure FW-6-B-3 for details.

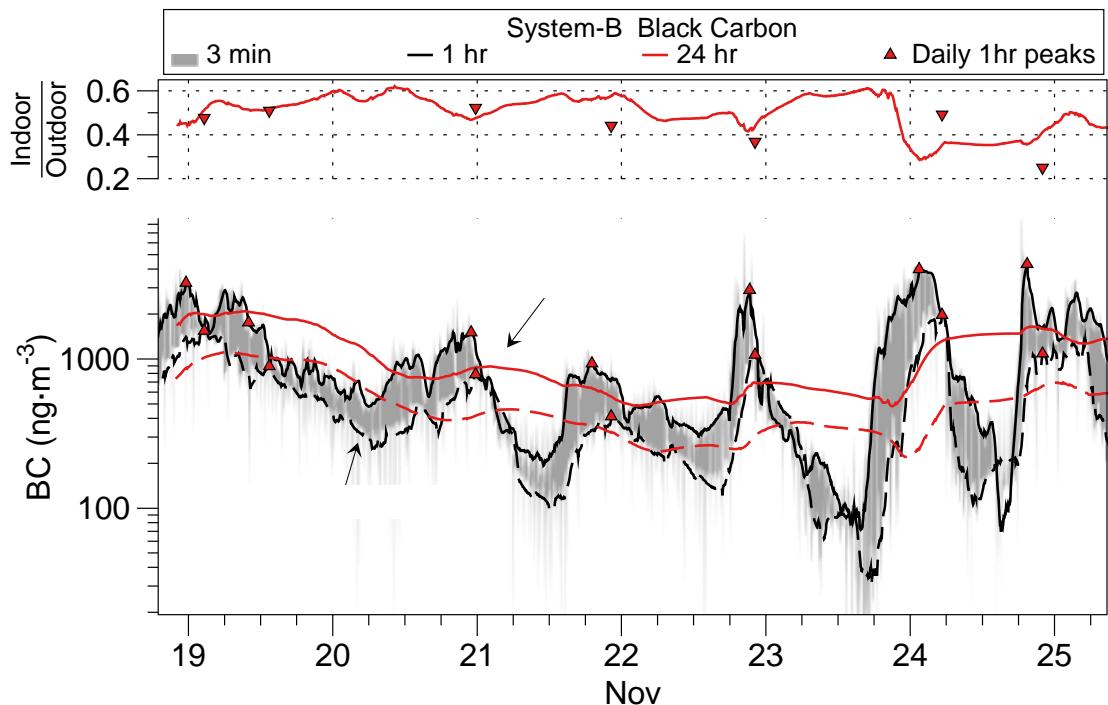


Figure FW-6-B-12. Black carbon concentrations measured outdoors and indoors during operation of System B, Nov 18-25, 2014. Data collected using AE22 Aethalometers with 3-min samples. Data otherwise as described in Figure FW-6-B-3 caption.

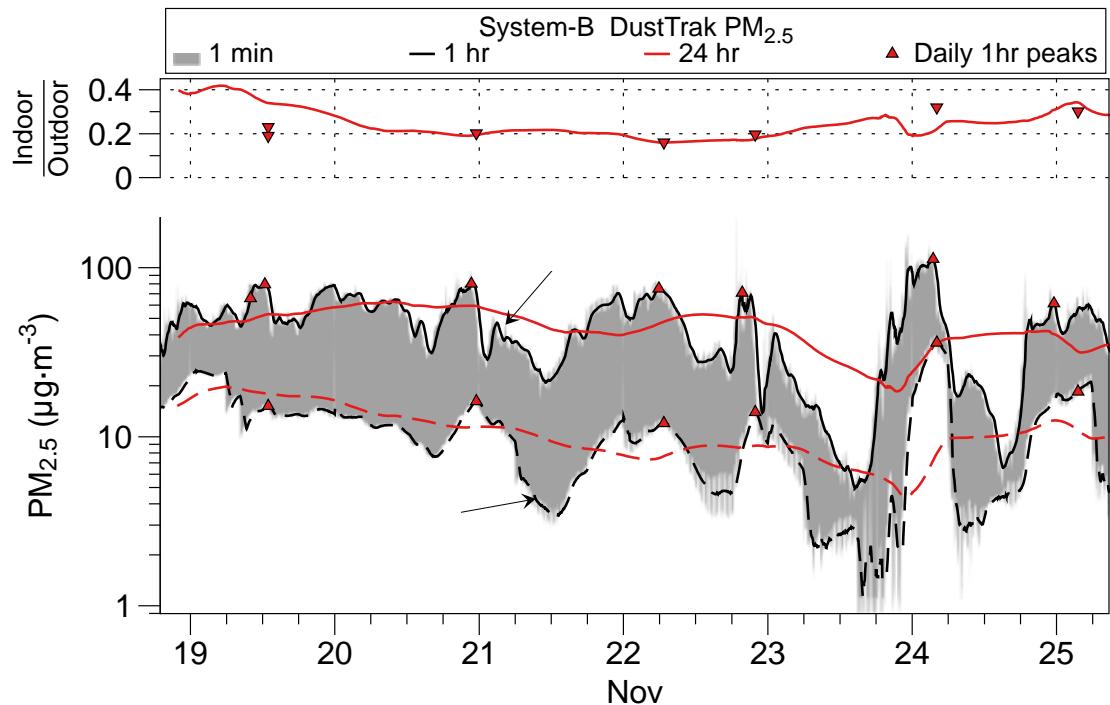


Figure FW-6-B-13. PM_{2.5} reported by TSI DustTrak II 8530 measurements outdoors and indoors during operation of System B, Nov 18-25, 2014. The DustTrak measures light scattering and uses a calibration to estimate PM_{2.5} mass. Refer to “Guide” before Figure FW-6-B-3.

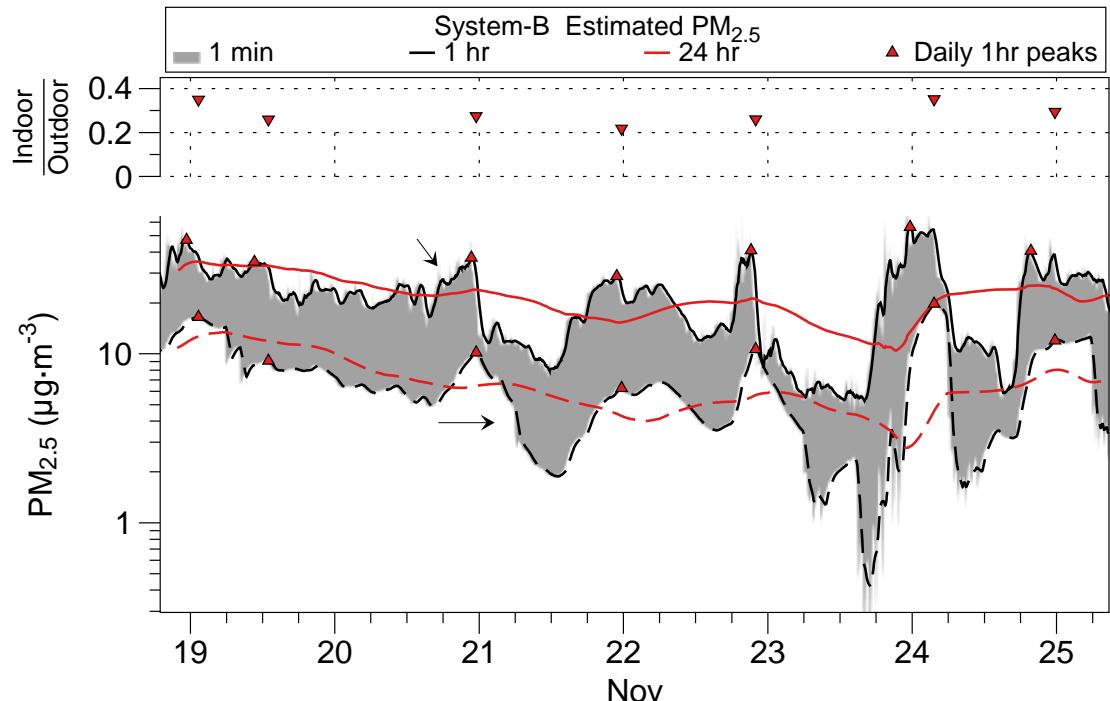


Figure FW-6-B-14. Estimated PM_{2.5} concentration calculated from size-resolved particle number concentrations measured by MetOne and CPC during operation of System B, Nov 18-25, 2014. Details provided in body of report. Refer to “Guide” before Figure FW-6-B-3.

Table FW-6-B-2. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6 nm to 2.5 micron measured using the TSI 3787 CPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.5E+4	5.0E+3	5.8E+3	5.2E+3	5.3E+3	9.9E+3	1.1E+4	8.2E+3	3.7E+3
Outdoor 24 SD	4.4E+3	3.0E+3	3.9E+3	3.0E+3	5.2E+3	6.2E+3	6.3E+3	4.6E+3	1.3E+3
Indoor 24h mean	4.3E+3	2.1E+3	1.9E+3	1.4E+3	1.7E+3	2.0E+3	2.9E+3	2.3E+3	9.2E+2
Indoor 24 SD	1.2E+3	6.0E+2	8.7E+2	4.9E+2	1.1E+3	2.0E+3	1.6E+3	1.1E+3	5.0E+2
24h mean In/Out	0.28	0.32	0.35	0.31	0.31	0.24	0.24	0.29	0.04
Highest 8h Outdoor	1.7E+4	1.5E+4	9.1E+3	8.6E+3	1.0E+4	1.6E+4	1.8E+4	1.3E+4	3.7E+3
Highest 8h Indoor	5.4E+3	3.5E+3	2.9E+3	1.9E+3	3.0E+3	4.5E+3	4.7E+3	3.7E+3	1.1E+3
Highest 8 h In/Out	0.32	0.24	0.32	0.22	0.29	0.27	0.26	0.27	0.04
Highest 1h Outdoor	2.2E+4	1.6E+4	1.1E+4	1.1E+4	2.0E+4	2.1E+4	2.7E+4	1.8E+4	5.6E+3
Highest 1 h Indoor ²	5.4E+3	3.5E+3	2.9E+3	1.9E+3	3.0E+3	4.5E+3	4.7E+3	4.0E+3	1.2E+3
Highest 1h In/Out	0.27	0.20	0.32	0.18	0.23	0.18	0.18	0.22	0.05
Time of highest 1h Outdoor	11/18/14 21:02	11/19/14 10:00	11/20/14 23:01	11/21/14 18:33	11/22/14 19:43	11/23/14 20:24	11/24/14 19:37		
Corresponding highest 1h Indoor	11/18/14 23:45	11/19/14 10:28	11/20/14 23:29	11/21/14 21:33	11/22/14 21:54	11/24/14 0:24	11/24/14 20:35		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 11/18/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-6-B-3. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100 nm to 2.5 micron measured using the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	5.0E+3	1.9E+3	1.8E+3	1.5E+3	1.8E+3	3.9E+3	3.7E+3	2.8E+3	1.3E+3
Outdoor 24 SD	1.5E+3	6.9E+2	1.3E+3	6.4E+2	1.9E+3	3.0E+3	1.8E+3	1.5E+3	7.5E+2
Indoor 24h mean	2.0E+3	1.1E+3	8.7E+2	6.8E+2	7.9E+2	1.0E+3	1.3E+3	1.1E+3	4.0E+2
Indoor 24 SD	5.3E+2	2.1E+2	3.9E+2	2.6E+2	4.6E+2	1.2E+3	7.1E+2	5.3E+2	3.0E+2
24h mean In/Out	0.37	0.45	0.51	0.48	0.45	0.33	0.30	0.41	0.07
Highest 8h Outdoor	6.1E+3	4.4E+3	3.2E+3	2.1E+3	3.5E+3	7.5E+3	5.4E+3	4.6E+3	1.7E+3
Highest 8h Indoor	2.5E+3	1.9E+3	1.3E+3	9.4E+2	1.3E+3	2.5E+3	2.1E+3	1.8E+3	5.6E+2
Highest 8 h In/Out	0.41	0.43	0.42	0.44	0.38	0.33	0.38	0.40	0.03
Highest 1h Outdoor	8.3E+3	3.4E+3	4.9E+3	2.7E+3	7.9E+3	9.3E+3	6.8E+3	6.2E+3	2.4E+3
Highest 1 h Indoor ²	2.5E+3	1.9E+3	1.3E+3	9.4E+2	1.3E+3	2.5E+3	2.1E+3	2.0E+3	8.1E+2
Highest 1h In/Out	0.33	0.39	0.34	0.34	0.25	0.38	0.32	0.34	0.04
Time of highest 1h Outdoor	11/18/14 22:58	11/19/14 10:00	11/20/14 22:41	11/21/14 22:59	11/22/14 21:13	11/24/14 3:33	11/24/14 23:40		
Corresponding highest 1h Indoor	11/19/14 1:06	11/19/14 12:57	11/20/14 23:34	11/22/14 2:59	11/22/14 22:01	11/24/14 4:11	11/25/14 0:09		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 11/18/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-6-B-4. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6–100 nm based on difference between concentrations measured using the TSI 3787 CPC and the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.0E+4	3.1E+3	4.0E+3	3.6E+3	3.5E+3	6.0E+3	7.5E+3	5.4E+3	2.4E+3
Outdoor 24 SD	3.7E+3	2.4E+3	2.9E+3	2.8E+3	3.6E+3	4.2E+3	4.8E+3	3.5E+3	7.9E+2
Indoor 24h mean	2.4E+3	1.0E+3	1.0E+3	7.5E+2	8.9E+2	1.0E+3	1.6E+3	1.2E+3	5.2E+2
Indoor 24 SD	6.6E+2	4.0E+2	5.0E+2	3.1E+2	6.5E+2	8.4E+2	9.7E+2	6.2E+2	2.2E+2
24h mean In/Out	0.24	0.25	0.27	0.24	0.24	0.20	0.20	0.23	0.03
Highest 8h Outdoor	1.1E+4	1.1E+4	6.4E+3	6.9E+3	6.9E+3	1.0E+4	1.3E+4	9.2E+3	2.3E+3
Highest 8h Indoor	3.0E+3	1.8E+3	1.3E+3	1.1E+3	1.7E+3	1.8E+3	2.7E+3	1.9E+3	6.4E+2
Highest 8 h In/Out	0.27	0.17	0.21	0.16	0.24	0.18	0.22	0.21	0.04
Highest 1h Outdoor	1.5E+4	1.2E+4	8.2E+3	9.2E+3	1.4E+4	1.6E+4	2.1E+4	1.4E+4	3.9E+3
Highest 1 h Indoor ²	3.0E+3	1.8E+3	1.3E+3	1.1E+3	1.7E+3	1.8E+3	2.7E+3	2.2E+3	8.1E+2
Highest 1h In/Out	0.23	0.15	0.17	0.13	0.18	0.12	0.16	0.16	0.03
Time of highest 1h Outdoor	11/18/14 21:07	11/19/14 10:00	11/20/14 14:15	11/21/14 18:33	11/22/14 19:44	11/23/14 20:24	11/24/14 19:34		
Corresponding highest 1h Indoor	11/18/14 23:40	11/19/14 10:24	11/20/14 18:15	11/21/14 21:26	11/22/14 21:46	11/24/14 0:24	11/24/14 20:30		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 11/18/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-6-B-5. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100–300 nm based on difference between concentrations measured using the TSI 3781 CPC with size selector and the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	5.0E+6	1.8E+6	1.7E+6	1.4E+6	1.7E+6	3.9E+6	3.7E+6	2.7E+6	1.3E+6
Outdoor 24 SD	1.5E+6	7.0E+5	1.2E+6	6.2E+5	1.8E+6	3.0E+6	1.8E+6	1.5E+6	7.4E+5
Indoor 24h mean	1.9E+6	1.0E+6	8.5E+5	6.6E+5	7.7E+5	1.0E+6	1.2E+6	1.1E+6	4.0E+5
Indoor 24 SD	5.2E+5	2.1E+5	3.8E+5	2.5E+5	4.6E+5	1.1E+6	7.0E+5	5.2E+5	2.9E+5
24h mean In/Out	0.37	0.45	0.53	0.51	0.47	0.33	0.30	0.42	0.08
Highest 8h Outdoor	6.0E+6	4.3E+6	3.1E+6	2.0E+6	3.4E+6	7.4E+6	5.3E+6	4.5E+6	1.7E+6
Highest 8h Indoor	2.4E+6	1.8E+6	1.3E+6	9.0E+5	1.3E+6	2.4E+6	2.0E+6	1.8E+6	5.5E+5
Highest 8 h In/Out	0.41	0.43	0.42	0.46	0.39	0.33	0.38	0.40	0.04
Highest 1h Outdoor	8.2E+6	3.3E+6	4.7E+6	2.5E+6	7.8E+6	9.1E+6	6.7E+6	6.0E+6	2.4E+6
Highest 1 h Indoor ²	2.4E+6	1.8E+6	1.3E+6	9.0E+5	1.3E+6	2.4E+6	2.0E+6	2.0E+6	8.0E+5
Highest 1h In/Out	0.33	0.39	0.34	0.35	0.25	0.38	0.32	0.34	0.04
Time of highest 1h Outdoor	11/18/14 22:58	11/19/14 10:00	11/20/14 22:41	11/21/14 22:59	11/22/14 21:13	11/24/14 3:33	11/24/14 23:40		
Corresponding highest 1h Indoor	11/19/14 1:05	11/19/14 12:57	11/20/14 23:34	11/22/14 2:59	11/22/14 22:01	11/24/14 4:11	11/25/14 0:09		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 11/18/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-6-B-6. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.3–0.4 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	6.6E+4	9.0E+4	7.4E+4	8.3E+4	5.5E+4	4.7E+4	4.8E+4	6.6E+4	1.6E+4
Outdoor 24 SD	1.3E+4	1.3E+4	1.4E+4	1.6E+4	2.3E+4	3.8E+4	2.5E+4	2.0E+4	8.7E+3
Indoor 24h mean	3.1E+4	2.5E+4	2.0E+4	1.9E+4	1.7E+4	1.5E+4	1.7E+4	2.1E+4	5.2E+3
Indoor 24 SD	6.6E+3	1.6E+3	5.2E+3	7.1E+3	6.8E+3	1.8E+4	1.0E+4	8.0E+3	4.8E+3
24h mean In/Out	0.49	0.37	0.27	0.23	0.27	0.30	0.35	0.33	0.08
Highest 8h Outdoor	7.3E+4	1.0E+5	9.1E+4	9.7E+4	9.6E+4	9.3E+4	7.1E+4	8.9E+4	1.1E+4
Highest 8h Indoor	3.8E+4	2.6E+4	2.3E+4	2.6E+4	2.6E+4	3.8E+4	3.0E+4	3.0E+4	5.6E+3
Highest 8 h In/Out	0.52	0.25	0.26	0.27	0.27	0.41	0.42	0.34	0.10
Highest 1h Outdoor	8.2E+4	1.1E+5	1.0E+5	1.1E+5	1.0E+5	1.2E+5	8.1E+4	1.0E+5	1.3E+4
Highest 1 h Indoor ²	3.8E+4	2.6E+4	2.3E+4	2.6E+4	2.6E+4	3.8E+4	3.0E+4	3.4E+4	8.9E+3
Highest 1h In/Out	0.34	0.24	0.31	0.27	0.29	0.46	0.45	0.34	0.08
Time of highest 1h Outdoor	11/19/14 10:00	11/19/14 23:48	11/20/14 23:02	11/22/14 5:48	11/22/14 21:09	11/24/14 3:31	11/25/14 3:48		
Corresponding highest 1h Indoor	11/19/14 13:02	11/19/14 23:48	11/20/14 23:32	11/22/14 6:43	11/22/14 21:59	11/24/14 4:10	11/25/14 5:43		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 11/18/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-6-B-7. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.4–0.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.3E+4	2.8E+4	2.5E+4	2.5E+4	1.1E+4	8.6E+3	8.8E+3	1.7E+4	7.9E+3
Outdoor 24 SD	4.1E+3	7.3E+3	7.3E+3	7.7E+3	6.4E+3	8.5E+3	4.9E+3	6.6E+3	1.4E+3
Indoor 24h mean	5.1E+3	4.2E+3	3.5E+3	3.0E+3	2.3E+3	2.4E+3	2.7E+3	3.3E+3	9.6E+2
Indoor 24 SD	1.1E+3	3.4E+2	8.9E+2	1.2E+3	9.7E+2	2.8E+3	1.7E+3	1.3E+3	7.3E+2
24h mean In/Out	0.44	0.25	0.14	0.12	0.15	0.23	0.31	0.24	0.10
Highest 8h Outdoor	1.5E+4	3.4E+4	3.4E+4	3.0E+4	3.0E+4	1.9E+4	1.3E+4	2.5E+4	8.4E+3
Highest 8h Indoor	5.3E+3	4.3E+3	4.3E+3	4.1E+3	4.1E+3	6.0E+3	4.7E+3	4.7E+3	6.6E+2
Highest 8 h In/Out	0.35	0.12	0.12	0.14	0.14	0.32	0.36	0.22	0.11
Highest 1h Outdoor	2.5E+4	3.7E+4	3.6E+4	3.5E+4	2.4E+4	2.6E+4	1.6E+4	2.8E+4	7.3E+3
Highest 1 h Indoor ²	5.3E+3	4.3E+3	4.3E+3	4.1E+3	4.1E+3	6.0E+3	4.7E+3	5.1E+3	1.3E+3
Highest 1h In/Out	0.20	0.12	0.13	0.14	0.15	0.31	0.35	0.20	0.09
Time of highest 1h Outdoor	11/19/14 10:00	11/20/14 4:08	11/20/14 10:00	11/22/14 6:33	11/22/14 10:00	11/23/14 23:18	11/25/14 5:16		
Corresponding highest 1h Indoor	11/19/14 13:01	11/20/14 4:19	11/20/14 10:30	11/22/14 6:53	11/22/14 10:00	11/24/14 3:18	11/25/14 5:43		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 11/18/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-6-B-8. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.5–0.7 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	7.8E+3	1.8E+4	1.4E+4	1.4E+4	5.2E+3	4.7E+3	4.7E+3	9.6E+3	4.9E+3
Outdoor 24 SD	3.0E+3	4.9E+3	5.0E+3	5.3E+3	3.6E+3	5.0E+3	2.8E+3	4.2E+3	9.7E+2
Indoor 24h mean	2.9E+3	2.3E+3	1.8E+3	1.4E+3	9.7E+2	1.3E+3	1.4E+3	1.7E+3	6.1E+2
Indoor 24 SD	6.2E+2	2.6E+2	5.2E+2	5.5E+2	4.2E+2	1.5E+3	8.8E+2	6.7E+2	3.7E+2
24h mean In/Out	0.43	0.22	0.12	0.12	0.13	0.24	0.31	0.22	0.11
Highest 8h Outdoor	8.9E+3	2.1E+4	2.1E+4	1.7E+4	1.7E+4	1.0E+4	6.9E+3	1.5E+4	5.5E+3
Highest 8h Indoor	2.9E+3	2.4E+3	2.4E+3	1.8E+3	1.8E+3	3.1E+3	2.5E+3	2.4E+3	4.7E+2
Highest 8 h In/Out	0.33	0.11	0.11	0.10	0.11	0.30	0.36	0.20	0.11
Highest 1h Outdoor	1.7E+4	2.4E+4	2.3E+4	2.1E+4	1.3E+4	1.8E+4	9.0E+3	1.8E+4	4.9E+3
Highest 1 h Indoor ²	2.9E+3	2.4E+3	2.4E+3	1.8E+3	1.8E+3	3.1E+3	2.5E+3	2.7E+3	7.4E+2
Highest 1h In/Out	0.16	0.10	0.12	0.10	0.12	0.23	0.33	0.17	0.08
Time of highest 1h Outdoor	11/19/14 10:00	11/20/14 4:10	11/20/14 10:06	11/22/14 6:40	11/22/14 10:00	11/23/14 23:18	11/25/14 5:16		
Corresponding highest 1h Indoor	11/19/14 11:13	11/20/14 8:10	11/20/14 10:20	11/22/14 6:52	11/22/14 10:00	11/24/14 3:18	11/25/14 5:43		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 11/18/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-6-B-9. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.7–1.0 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.5E+3	2.3E+3	1.6E+3	1.7E+3	6.1E+2	8.7E+2	8.3E+2	1.3E+3	5.5E+2
Outdoor 24 SD	5.0E+2	7.1E+2	1.1E+3	7.0E+2	5.3E+2	1.0E+3	4.8E+2	7.2E+2	2.3E+2
Indoor 24h mean	5.3E+2	3.8E+2	2.8E+2	1.9E+2	1.4E+2	2.2E+2	2.4E+2	2.8E+2	1.2E+2
Indoor 24 SD	1.1E+2	6.2E+1	9.3E+1	6.7E+1	5.6E+1	2.4E+2	1.4E+2	1.1E+2	5.9E+1
24h mean In/Out	0.40	0.23	0.16	0.17	0.14	0.25	0.29	0.23	0.08
Highest 8h Outdoor	1.7E+3	2.7E+3	2.7E+3	2.2E+3	2.0E+3	1.9E+3	1.1E+3	2.1E+3	5.2E+2
Highest 8h Indoor	5.1E+2	4.0E+2	3.4E+2	2.4E+2	2.3E+2	5.2E+2	3.8E+2	3.7E+2	1.1E+2
Highest 8 h In/Out	0.31	0.15	0.13	0.11	0.11	0.27	0.33	0.20	0.09
Highest 1h Outdoor	3.0E+3	4.0E+3	3.5E+3	2.7E+3	1.6E+3	3.8E+3	1.8E+3	2.9E+3	8.7E+2
Highest 1 h Indoor ²	5.1E+2	4.0E+2	3.4E+2	2.4E+2	2.3E+2	5.2E+2	3.8E+2	4.2E+2	1.5E+2
Highest 1h In/Out	0.15	0.11	0.15	0.10	0.13	0.18	0.22	0.15	0.04
Time of highest 1h Outdoor	11/19/14 10:00	11/19/14 11:25	11/20/14 10:44	11/21/14 22:00	11/22/14 10:00	11/23/14 23:18	11/24/14 19:44		
Corresponding highest 1h Indoor	11/19/14 11:14	11/19/14 11:25	11/20/14 10:44	11/21/14 23:20	11/22/14 10:00	11/24/14 3:18	11/24/14 23:44		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 11/18/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-6-B-10. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 1.0–2.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	8.7E+2	5.1E+2	4.1E+2	4.5E+2	2.0E+2	4.6E+2	4.3E+2	4.8E+2	1.9E+2
Outdoor 24 SD	2.0E+2	2.7E+2	3.1E+2	1.5E+2	1.7E+2	4.9E+2	2.0E+2	2.6E+2	1.1E+2
Indoor 24h mean	2.7E+2	1.5E+2	1.0E+2	7.2E+1	5.5E+1	9.1E+1	1.0E+2	1.2E+2	6.7E+1
Indoor 24 SD	5.7E+1	2.5E+1	3.3E+1	2.2E+1	2.0E+1	9.2E+1	5.6E+1	4.3E+1	2.4E+1
24h mean In/Out	0.35	0.28	0.28	0.24	0.20	0.23	0.24	0.26	0.04
Highest 8h Outdoor	9.9E+2	9.4E+2	7.2E+2	6.0E+2	4.6E+2	9.2E+2	5.5E+2	7.4E+2	2.0E+2
Highest 8h Indoor	3.1E+2	1.9E+2	1.2E+2	8.9E+1	8.2E+1	2.1E+2	1.6E+2	1.7E+2	7.4E+1
Highest 8 h In/Out	0.31	0.20	0.17	0.15	0.18	0.23	0.30	0.22	0.06
Highest 1h Outdoor	1.4E+3	1.2E+3	9.8E+2	7.1E+2	5.7E+2	1.9E+3	9.1E+2	1.1E+3	4.2E+2
Highest 1 h Indoor ²	3.1E+2	1.9E+2	1.2E+2	8.9E+1	8.2E+1	2.1E+2	1.6E+2	1.8E+2	8.1E+1
Highest 1h In/Out	0.24	0.17	0.13	0.14	0.18	0.14	0.19	0.17	0.04
Time of highest 1h Outdoor	11/18/14 18:52	11/19/14 11:25	11/20/14 14:17	11/21/14 21:42	11/22/14 20:05	11/23/14 23:18	11/24/14 19:44		
Corresponding highest 1h Indoor	11/18/14 19:18	11/19/14 13:01	11/20/14 14:53	11/21/14 22:52	11/22/14 20:55	11/24/14 3:18	11/24/14 20:41		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 11/18/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-6-B-11. Summary statistics for estimated PM_{2.5} concentrations ($\mu\text{g m}^{-3}$) calculated from particle number concentrations resolved by size from 6 nm to 2.5 microns (as reported in Tables FW-5-A-2 to FW-5-A-9) and resulting indoor/outdoor ratios.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	2.1E+3	8.2E+2	7.9E+2	5.4E+2	6.2E+2	1.4E+3	1.4E+3	1.1E+3	5.2E+2
Outdoor 24 SD	7.9E+2	3.6E+2	4.5E+2	2.3E+2	8.0E+2	1.3E+3	1.1E+3	7.3E+2	3.8E+2
Indoor 24h mean	1.1E+3	5.0E+2	4.3E+2	2.5E+2	3.5E+2	5.1E+2	6.0E+2	5.3E+2	2.4E+2
Indoor 24 SD	3.8E+2	2.1E+2	2.2E+2	1.1E+2	3.0E+2	6.8E+2	4.6E+2	3.3E+2	1.8E+2
24h mean In/Out	0.50	0.56	0.53	0.54	0.51	0.46	0.41	0.50	0.05
Highest 8h Outdoor	2.3E+3	2.2E+3	1.2E+3	7.9E+2	1.3E+3	3.0E+3	2.1E+3	1.8E+3	7.2E+2
Highest 8h Indoor	1.4E+3	1.2E+3	6.5E+2	3.5E+2	7.0E+2	1.3E+3	1.1E+3	9.4E+2	3.5E+2
Highest 8 h In/Out	0.60	0.54	0.53	0.45	0.56	0.42	0.50	0.51	0.06
Highest 1h Outdoor	3.2E+3	1.8E+3	1.5E+3	9.3E+2	2.9E+3	4.0E+3	4.3E+3	2.7E+3	1.2E+3
Highest 1 h Indoor ²	1.4E+3	1.2E+3	6.5E+2	3.5E+2	7.0E+2	1.3E+3	1.1E+3	1.1E+3	4.7E+2
Highest 1h In/Out	0.48	0.51	0.52	0.44	0.37	0.49	0.25	0.44	0.09
Time of highest 1h Outdoor	11/18/14 23:36	11/19/14 10:00	11/20/14 23:00	11/21/14 19:06	11/22/14 21:18	11/24/14 1:30	11/24/14 19:27		
Corresponding highest 1h Indoor	11/19/14 2:39	11/19/14 13:27	11/20/14 23:45	11/21/14 22:18	11/22/14 22:12	11/24/14 5:18	11/24/14 22:00		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 11/18/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-6-B-12. Summary statistics for concentrations of PM_{2.5} ($\mu\text{g m}^{-3}$) and indoor /outdoor ratios from measurements reported by TSI DustTrak II.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	4.9E-2	6.3E-2	4.6E-2	5.2E-2	2.9E-2	3.9E-2	3.5E-2	4.5E-2	1.0E-2
Outdoor 24 SD	1.1E-2	1.1E-2	1.6E-2	1.7E-2	1.8E-2	3.7E-2	1.9E-2	1.8E-2	8.0E-3
Indoor 24h mean	1.9E-2	1.3E-2	1.0E-2	8.4E-3	7.0E-3	9.9E-3	1.0E-2	1.1E-2	3.5E-3
Indoor 24 SD	4.4E-3	1.4E-3	3.2E-3	3.1E-3	3.4E-3	1.2E-2	6.3E-3	4.9E-3	3.2E-3
24h mean In/Out	0.41	0.29	0.21	0.19	0.19	0.24	0.28	0.26	0.07
Highest 8h Outdoor	5.4E-2	7.1E-2	6.3E-2	6.5E-2	6.4E-2	8.2E-2	5.3E-2	6.5E-2	9.3E-3
Highest 8h Indoor	2.3E-2	1.4E-2	1.2E-2	1.1E-2	1.1E-2	2.5E-2	1.8E-2	1.6E-2	5.4E-3
Highest 8 h In/Out	0.42	0.19	0.19	0.16	0.17	0.30	0.34	0.25	0.09
Highest 1h Outdoor	6.6E-2	8.0E-2	8.0E-2	7.5E-2	7.1E-2	1.1E-1	6.1E-2	7.8E-2	1.5E-2
Highest 1 h Indoor ²	2.3E-2	1.4E-2	1.2E-2	1.1E-2	1.1E-2	2.5E-2	1.8E-2	1.8E-2	7.5E-3
Highest 1h In/Out	0.23	0.19	0.20	0.16	0.20	0.32	0.30	0.23	0.06
Time of highest 1h Outdoor	11/19/14 10:00	11/19/14 12:23	11/20/14 22:43	11/22/14 5:53	11/22/14 19:44	11/24/14 3:30	11/24/14 23:35		
Corresponding highest 1h Indoor	11/19/14 12:57	11/19/14 12:57	11/20/14 23:33	11/22/14 6:43	11/22/14 21:54	11/24/14 4:06	11/25/14 3:35		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 11/18/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-6-B-13. Daily¹ summary statistics for concentrations (nanograms m^{-3}) and indoor /outdoor ratios of aerosol black carbon measured using the Aethalometer AE22.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	2.1E+3	8.2E+2	7.9E+2	5.4E+2	6.2E+2	1.4E+3	1.4E+3	1.1E+3	5.2E+2
Outdoor 24 SD	7.9E+2	3.6E+2	4.5E+2	2.3E+2	8.0E+2	1.3E+3	1.1E+3	7.3E+2	3.8E+2
Indoor 24h mean	1.1E+3	5.0E+2	4.3E+2	2.5E+2	3.5E+2	5.1E+2	6.0E+2	5.3E+2	2.4E+2
Indoor 24 SD	3.8E+2	2.1E+2	2.2E+2	1.1E+2	3.0E+2	6.8E+2	4.6E+2	3.3E+2	1.8E+2
24h mean In/Out	0.50	0.56	0.53	0.54	0.51	0.46	0.41	0.50	0.05
Highest 8h Outdoor	2.3E+3	2.2E+3	1.2E+3	7.9E+2	1.3E+3	3.0E+3	2.1E+3	1.8E+3	7.2E+2
Highest 8h Indoor	1.4E+3	1.2E+3	6.5E+2	3.5E+2	7.0E+2	1.3E+3	1.1E+3	9.4E+2	3.5E+2
Highest 8 h In/Out	0.60	0.54	0.53	0.45	0.56	0.42	0.50	0.51	0.06
Highest 1h Outdoor	3.2E+3	1.8E+3	1.5E+3	9.3E+2	2.9E+3	4.0E+3	4.3E+3	2.7E+3	1.2E+3
Highest 1 h Indoor ²	1.4E+3	1.2E+3	6.5E+2	3.5E+2	7.0E+2	1.3E+3	1.1E+3	1.1E+3	4.7E+2
Highest 1h In/Out	0.48	0.51	0.52	0.44	0.37	0.49	0.25	0.44	0.09
Time of highest 1h Outdoor	11/18/14 23:36	11/19/14 10:00	11/20/14 23:00	11/21/14 19:06	11/22/14 21:18	11/24/14 1:30	11/24/14 19:27		
Corresponding highest 1h Indoor	11/19/14 2:39	11/19/14 13:27	11/20/14 23:45	11/21/14 22:18	11/22/14 22:12	11/24/14 5:18	11/24/14 22:00		

¹ Based on 24h periods starting / ending at 10am. Day 1 starts at 11/18/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Appendix FW-7-D. Results for System D, November 25-December 2, 2014.

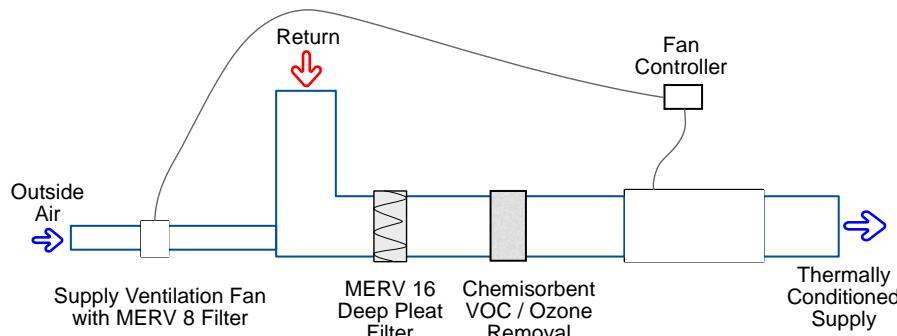


Table FW-7-D-1. Description of **System D** component characteristics during the period of **November 25-December 2, 2014**

System Parameter	Description or Measured Value
Heating	75,000 BTU/h, 80% eff., gas furnace, 1-stage burner
Cooling	3 ton, SEER13 air conditioner
Thermal distribution	Central fan with PSC motor: 1052 cfm for cooling, 957 cfm for heating
Ventilation	Supply fan discharging into the return plenum. Set to 114 cfm with the fan cycler running for 20 minutes every hour.
Filtration	MERV16, 5" (Lennox X8313) deep pleated filter installed inside the FAU cabinet. MERV8 on the supply fan discharge.
Recirculation blower schedule	As required for thermal conditioning, with fan cycler providing a minimum of 20 minutes per hour.
VOC removal system	Purafill PuraGRID product made with a proprietary "IAQ" mix (mostly activated carbon)

Notes about this monitoring period

We only had a single CPC 3781 instrument for the entire operational period. The CPC 3781 indoor / outdoor data stream was constructed from the single instrument. The aethalometers and DustTraks had detection limit issues for the indoor values. All of the other instruments were functioning normally.

The 24 h running statistics in the figures starts at 11/25/2014 19:00.

There was significant fog on the following days 11/26/2014, 11/27/2014, and 11/28/2014. It rained throughout the days on 11/29/2014 and 11/30/2014.

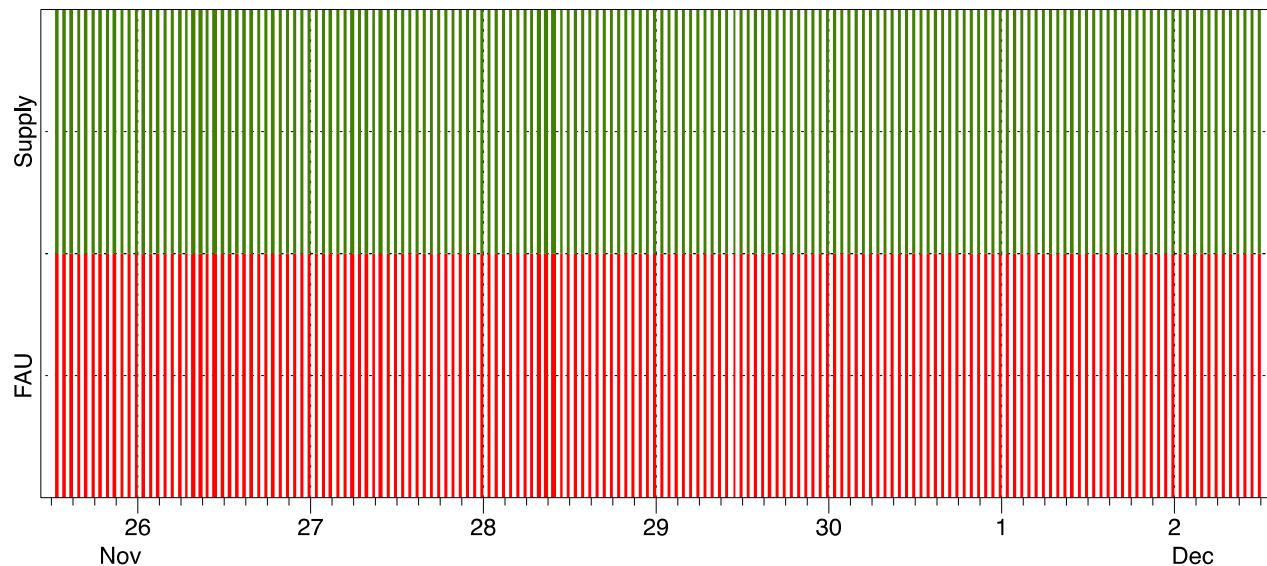


Figure FW-7-D-1. Operation of mechanical systems: Supply fan; fan on central forced air unit (FAU).

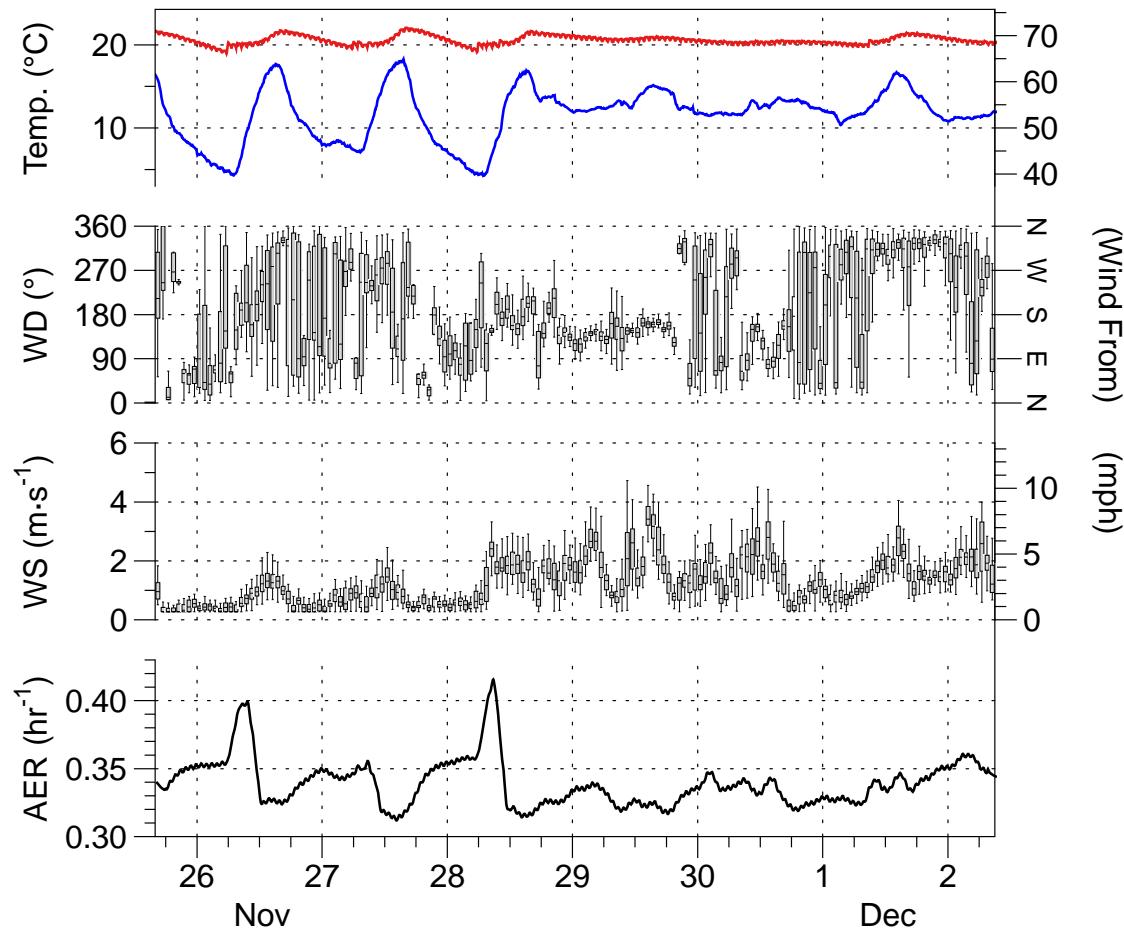


Figure FW-7-D-2. Environmental parameters measured during operation of System D, Nov 5-Dec 2, 2014. From top to bottom: indoor (red) and outdoor (blue) temperatures, wind direction (WD) in units of degrees from North, wind speed (WS), and air exchange rate (AER). For WD and WS, the box for each hour shows the 25th, 50th and 75th percentiles of the measured values and whiskers extend 1.5X the interquartile range (75th–25th percentile values) above the 75th and below the 25th percentile values.

Guide to plots of pollutant concentration time series and indoor / outdoor (I/O) ratios

The bottom section of each plot shows outdoor and indoor time series using the resolution of data collection: 3-min for black carbon and 1-min for all other parameters. The top and bottom of grey band are LOESS-smoothed, 1-min (or 3-min for black carbon) time-series. Also shown are time series with 1h and 24h time averaging for most pollutants and 1h and 8h average for ozone. Triangles in bottom of plot indicate the highest 1h outdoor and corresponding highest 1h indoor average during each day. The top section of each plot shows the ratio of indoor to outdoor running 24h mean values (8h for ozone) and the ratios of highest 1h indoor to corresponding highest 1h outdoor concentration each day.

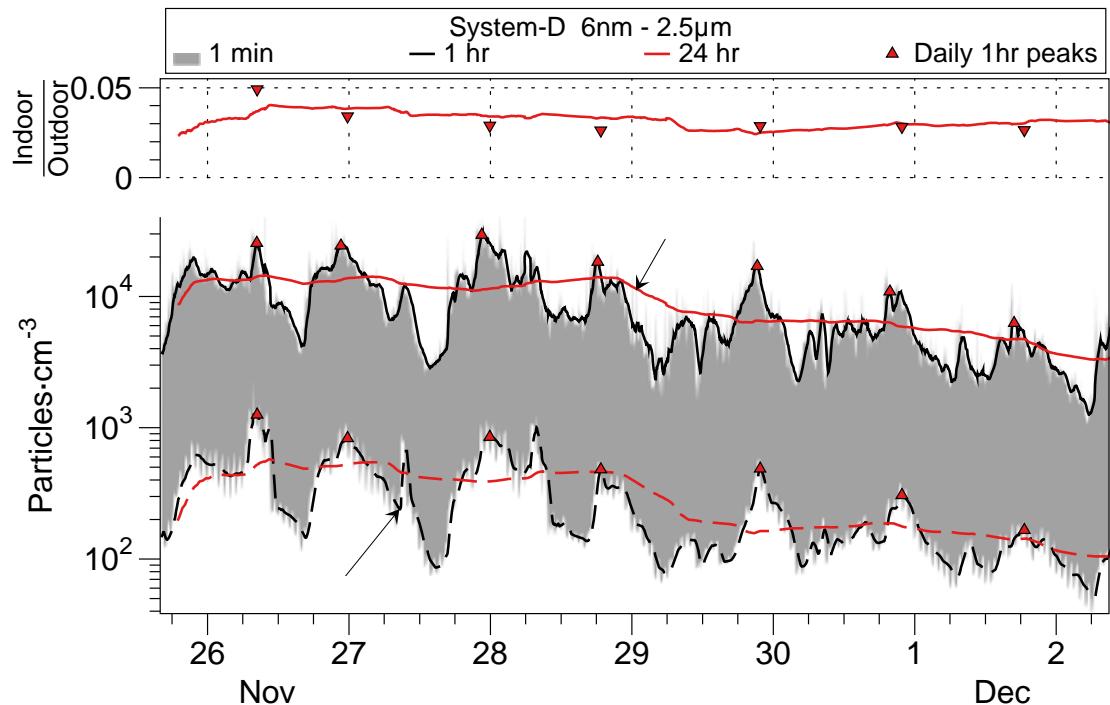


Figure FW-7-D-3. Number concentrations of 6 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of System D, Nov 25-Dec 2, 2014. Data collected using TSI 3787 CPCs.

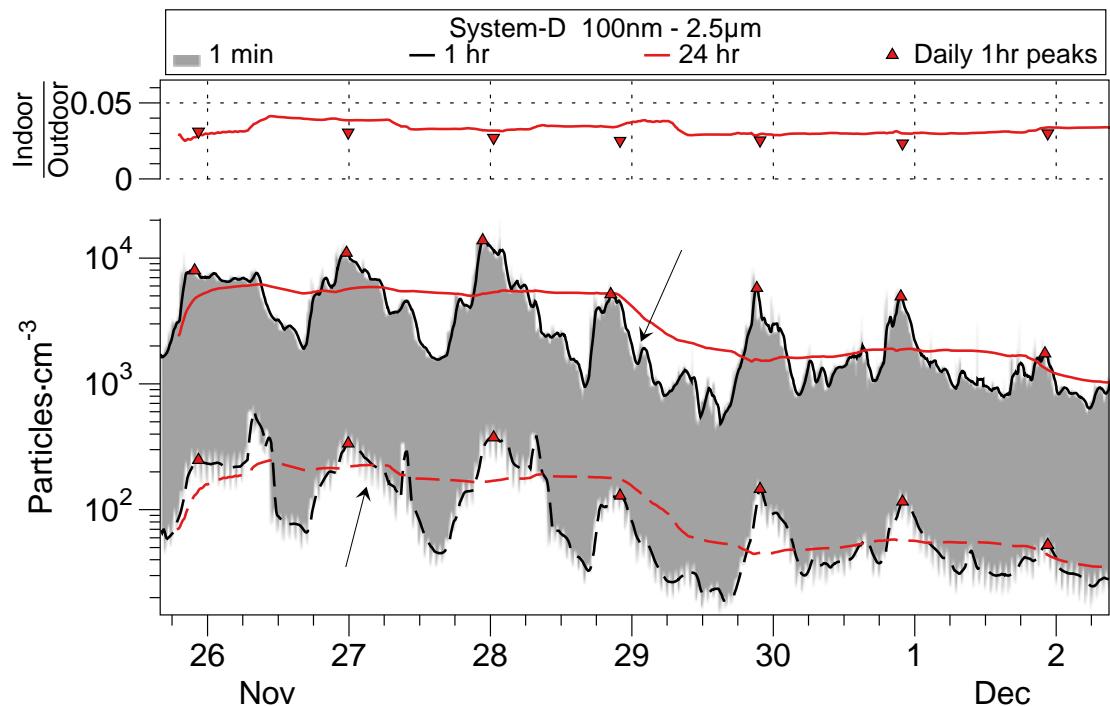


Figure FW-7-D-4. Number concentrations of 100 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of System D, Nov 25-Dec 2, 2014. Data collected using TSI 3781 CPCs outfitted with screens to exclude particles smaller than 100 nm. Refer to “Guide” before Figure FW-7-D-3.

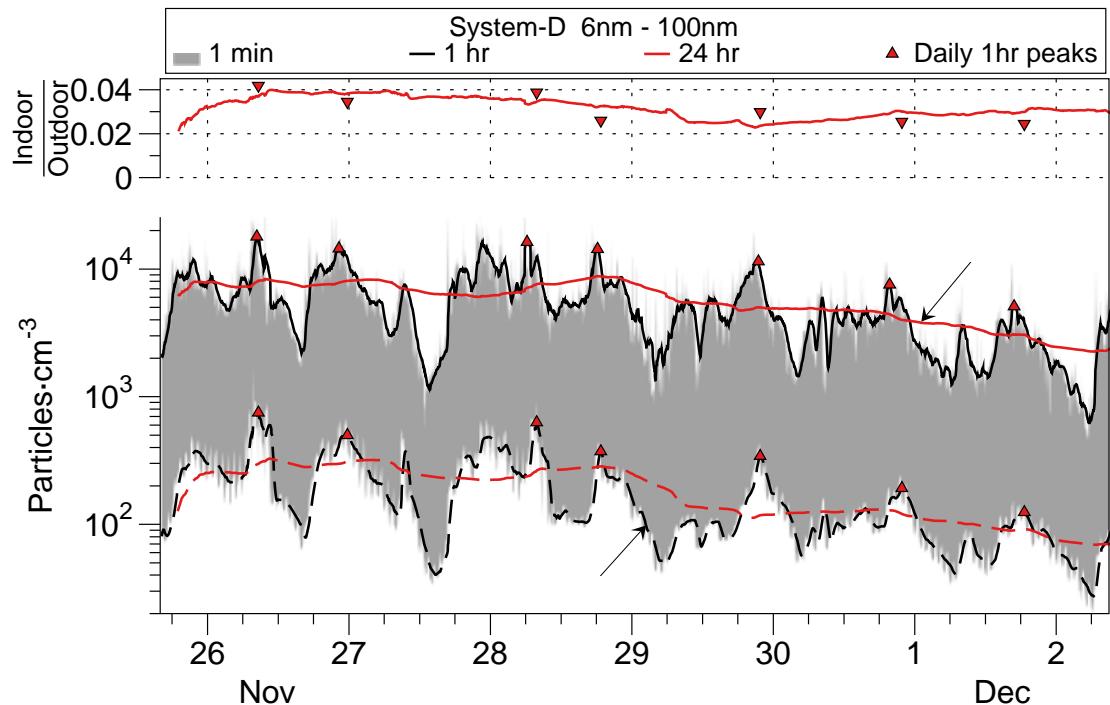


Figure FW-7-D-5. Number concentrations of 6–100 nm diameter particles measured outdoors and indoors during operation of System D, Nov 25-Dec 2, 2014. Data obtained as the difference between time series show in prior two figures. Refer to “Guide” before Figure FW-7-D-3.

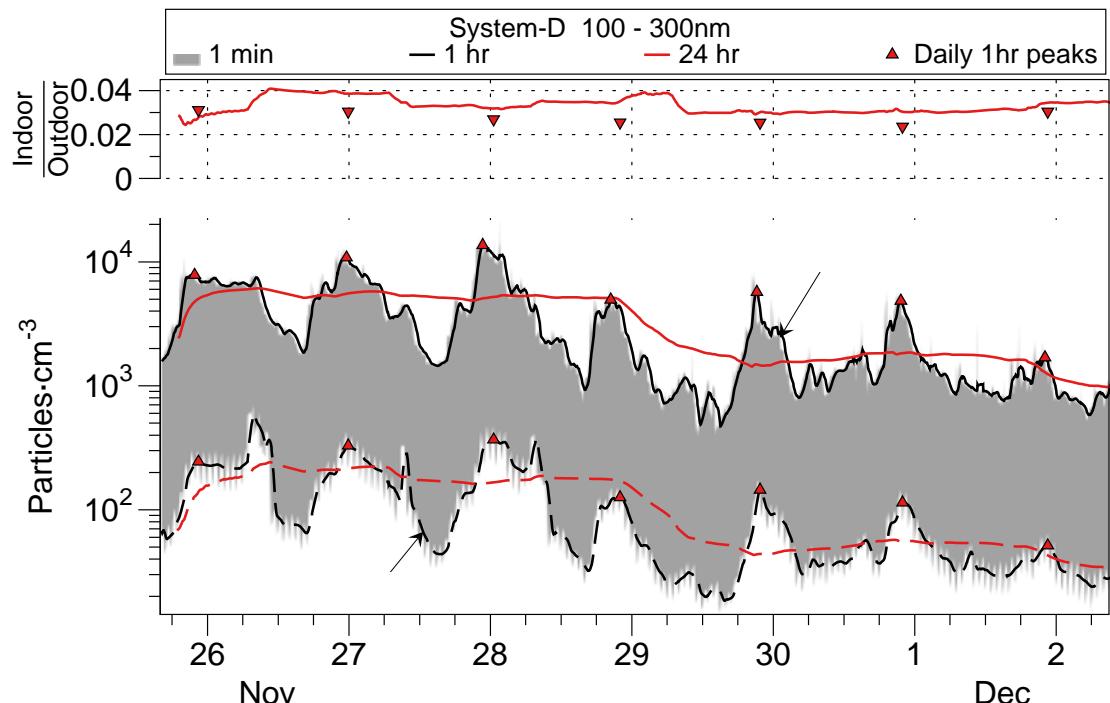


Figure FW-7-D-6. Number concentrations of 100–300 nm diameter particles measured outdoors and indoors during operation of System D, Nov 25-Dec 2, 2014. Data obtained as the difference between the TSI 3781 CPC with size selector and the MetOne BT637S OPC. Refer to “Guide” before Figure FW-7-D-3.

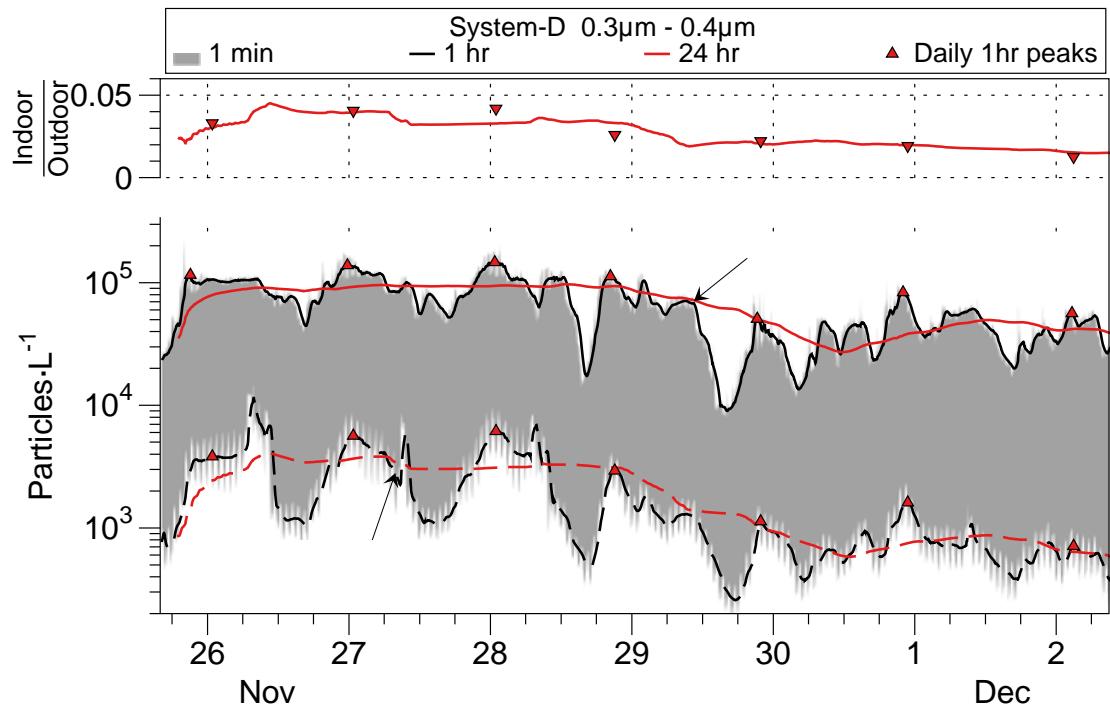


Figure FW-7-D-7. Number concentrations of 0.3–0.4 μm diameter particles measured outdoors and indoors during operation of System D, Nov 25-Dec 2, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-7-D-3.

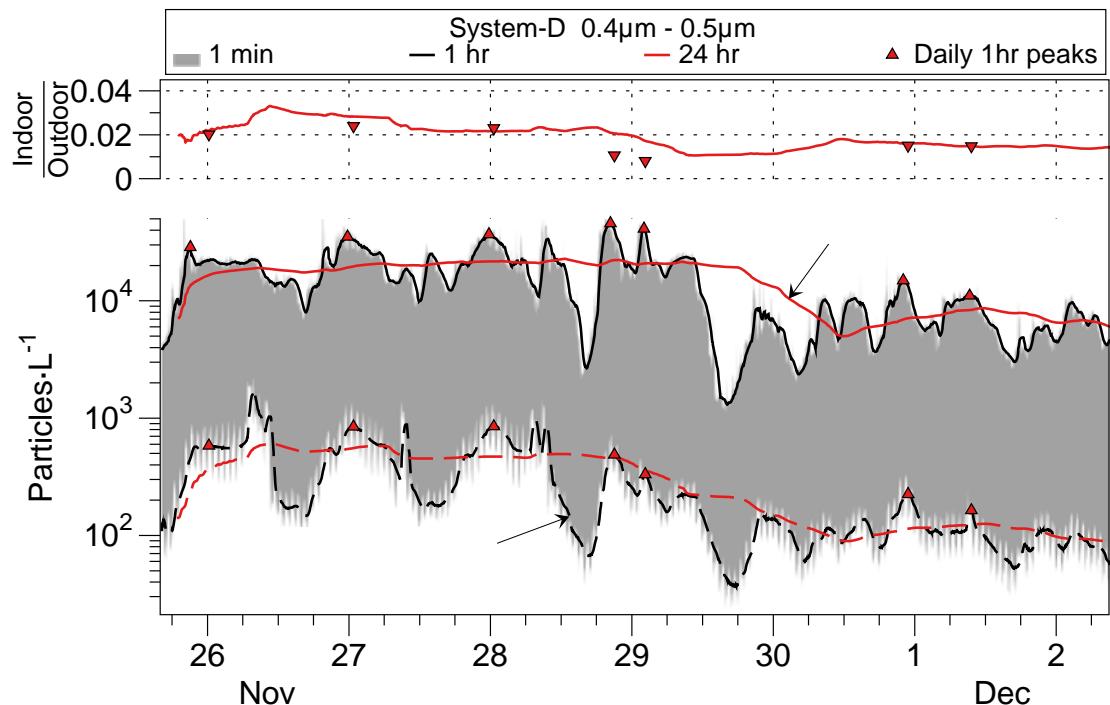


Figure FW-7-D-8. Number concentrations of 0.4–0.5 μm diameter particles measured outdoors and indoors during operation of System D, Nov 25-Dec 2, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-7-D-3.

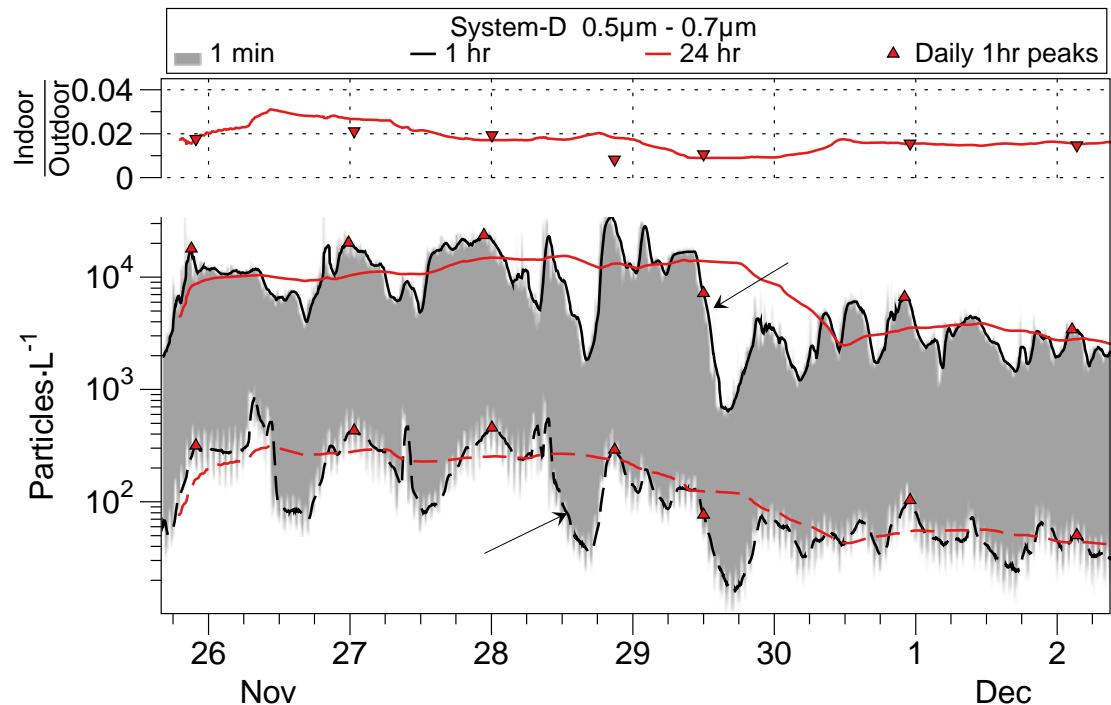


Figure FW-7-D-9. Number concentrations of 0.5–0.7 μm diameter particles measured outdoors and indoors during operation of System D, Nov 25-Dec 2, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-7-D-3.

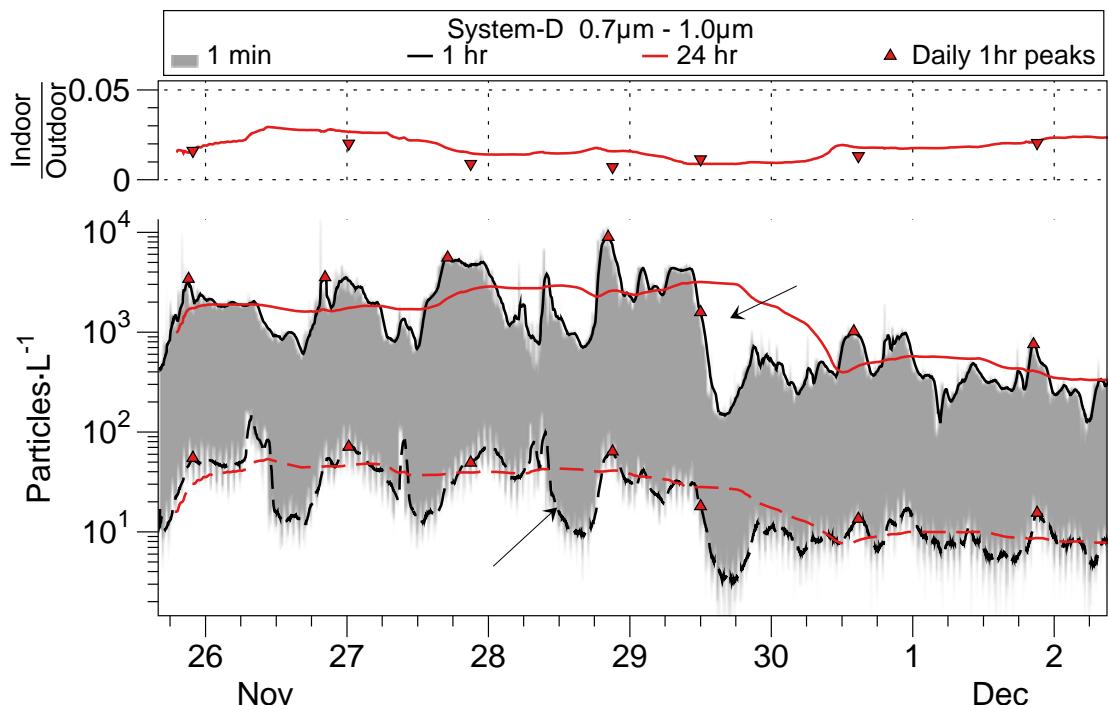


Figure FW-7-D-10. Number concentrations of 0.7–1.0 μm diameter particles measured outdoors and indoors during operation of System D, Nov 25-Dec 2, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-7-D-3.

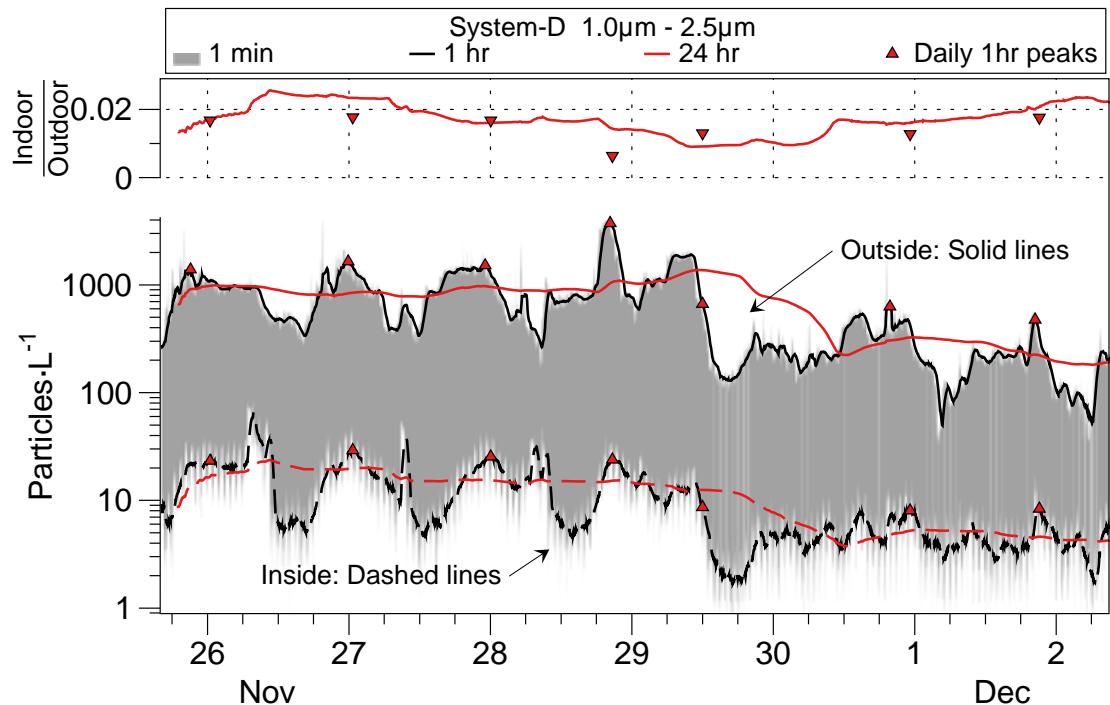


Figure FW-7-D-11. Number concentrations of 1.0–2.5 μm diameter particles measured outdoors and indoors during operation of System D, Nov 25-Dec 2, 2014. Data collected using MetOne BT637S particle counters. Refer to Figure FW-7-D-3 for details.

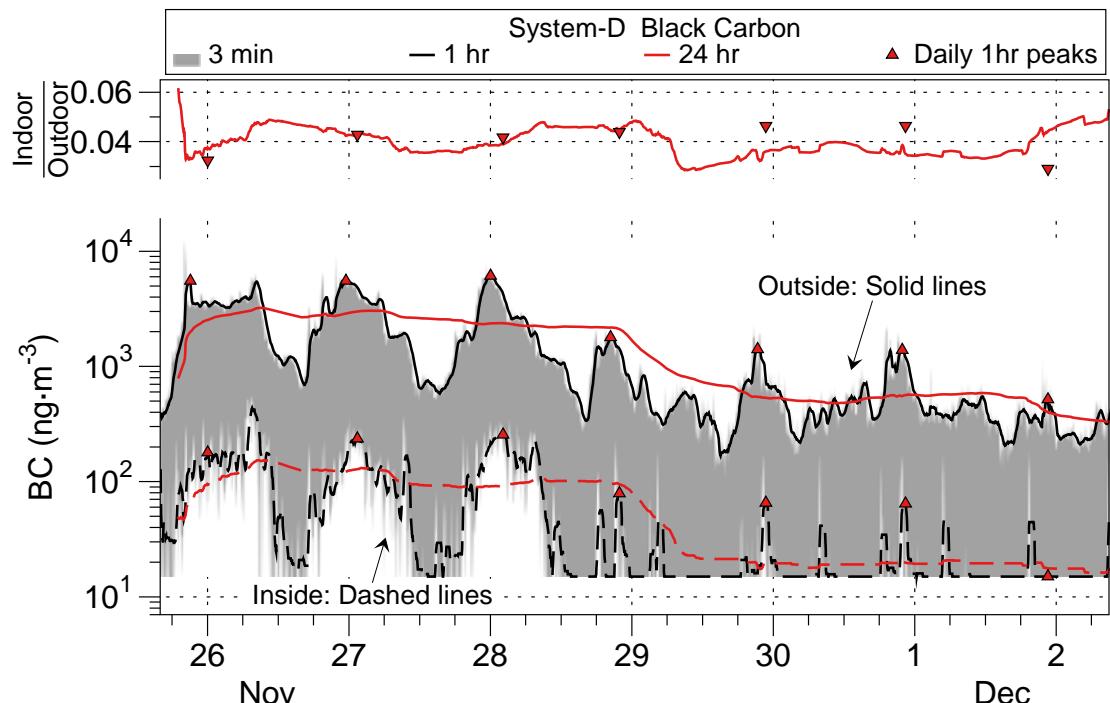


Figure FW-7-D-12. Black carbon concentrations measured outdoors and indoors during operation of System D, Nov 25-Dec 2, 2014. Data collected using AE22 Aethalometers with 3-min samples. Data otherwise as described in Figure FW-7-D-3 caption.

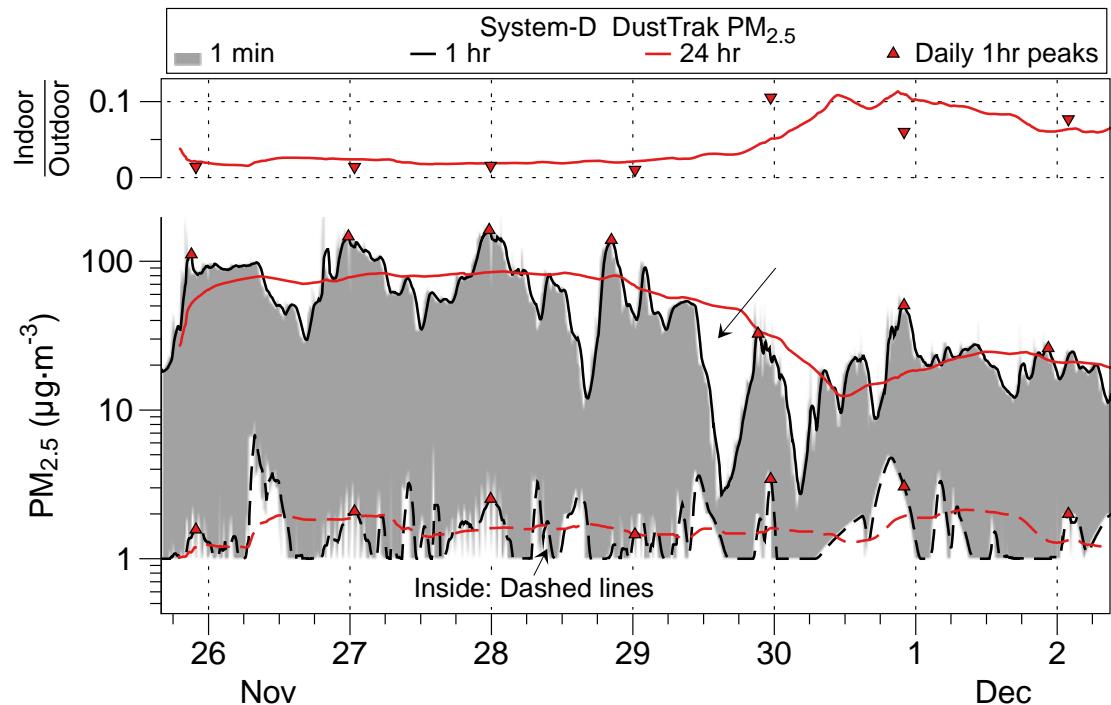


Figure FW-7-D-13. PM_{2.5} reported by TSI DustTrak II 8530 measurements outdoors and indoors during operation of System D, Nov 25-Dec 2, 2014. The DustTrak measures light scattering and uses a calibration to estimate PM_{2.5} mass. Refer to “Guide” before Figure FW-7-D-3.

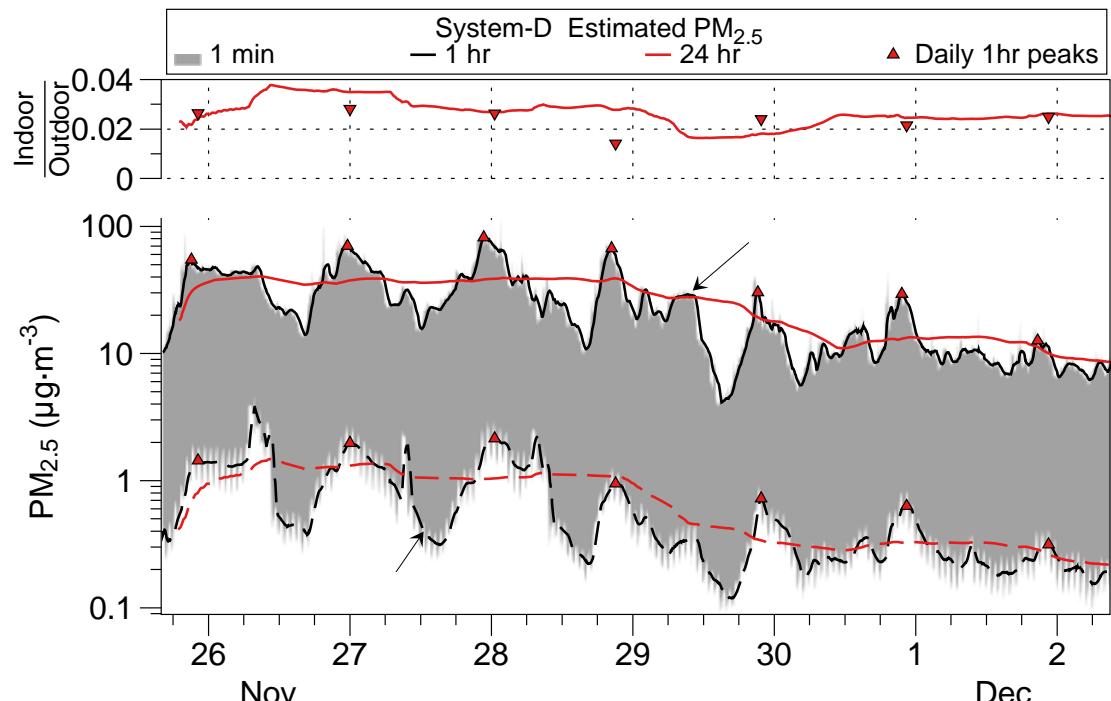


Figure FW-7-D-14. Estimated PM_{2.5} concentration calculated from size-resolved particle number concentrations measured by MetOne and CPC during operation of System D, Nov 25-Dec 2, 2014. Details provided in body of report. Refer to “Guide” before Figure FW-7-D-3.

Table FW-7-D-2. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6 nm to 2.5 micron measured using the TSI 3787 CPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.4E+4	1.2E+4	1.3E+4	7.3E+3	6.5E+3	5.0E+3	3.5E+3	8.8E+3	3.8E+3
Outdoor 24 SD	5.5E+3	5.9E+3	9.5E+3	4.2E+3	3.6E+3	2.6E+3	1.7E+3	4.7E+3	2.4E+3
Indoor 24h mean	5.5E+2	4.2E+2	4.5E+2	1.9E+2	1.8E+2	1.5E+2	1.1E+2	2.9E+2	1.6E+2
Indoor 24 SD	3.2E+2	2.2E+2	2.8E+2	1.1E+2	9.9E+1	6.7E+1	3.6E+1	1.6E+2	1.0E+2
24h mean In/Out	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.00
Highest 8h Outdoor	1.6E+4	1.9E+4	2.0E+4	1.2E+4	1.0E+4	7.5E+3	4.7E+3	1.3E+4	5.3E+3
Highest 8h Indoor	7.5E+2	6.5E+2	6.7E+2	4.7E+2	2.9E+2	2.1E+2	1.4E+2	4.6E+2	2.3E+2
Highest 8 h In/Out	0.05	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.01
Highest 1h Outdoor	2.6E+4	2.4E+4	2.9E+4	1.8E+4	1.7E+4	1.1E+4	6.3E+3	1.9E+4	7.7E+3
Highest 1 h Indoor ²	7.5E+2	6.5E+2	6.7E+2	4.7E+2	2.9E+2	2.1E+2	1.4E+2	6.3E+2	3.5E+2
Highest 1h In/Out	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.01
Time of highest 1h Outdoor	11/26/14 8:22	11/26/14 22:38	11/27/14 22:32	11/28/14 18:13	11/29/14 21:18	11/30/14 19:47	12/1/14 16:53		
Corresponding highest 1h Indoor	11/26/14 8:26	11/26/14 23:46	11/27/14 23:54	11/28/14 18:45	11/29/14 21:47	11/30/14 21:50	12/1/14 18:36		

¹ Based on 24h periods starting / ending at noon. Day 1 starts at 11/25/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-7-D-3. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100 nm to 2.5 micron measured using the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	5.8E+3	5.4E+3	5.3E+3	2.0E+3	1.7E+3	1.8E+3	1.0E+3	3.3E+3	1.9E+3
Outdoor 24 SD	2.0E+3	2.6E+3	3.8E+3	1.3E+3	1.2E+3	1.1E+3	3.2E+2	1.8E+3	1.1E+3
Indoor 24h mean	2.4E+2	1.8E+2	1.8E+2	5.8E+1	5.1E+1	5.5E+1	3.4E+1	1.1E+2	7.6E+1
Indoor 24 SD	1.4E+2	9.3E+1	1.2E+2	3.5E+1	3.3E+1	2.6E+1	9.5E+0	6.5E+1	4.8E+1
24h mean In/Out	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.00
Highest 8h Outdoor	7.2E+3	8.5E+3	9.7E+3	3.7E+3	3.0E+3	2.8E+3	1.3E+3	5.2E+3	3.0E+3
Highest 8h Indoor	2.6E+2	2.7E+2	3.0E+2	1.9E+2	8.9E+1	8.2E+1	4.3E+1	1.8E+2	9.7E+1
Highest 8 h In/Out	0.04	0.03	0.03	0.05	0.03	0.03	0.03	0.03	0.01
Highest 1h Outdoor	8.0E+3	1.1E+4	1.4E+4	5.1E+3	5.8E+3	4.9E+3	1.7E+3	7.2E+3	3.8E+3
Highest 1 h Indoor ²	2.6E+2	2.7E+2	3.0E+2	1.9E+2	8.9E+1	8.2E+1	4.3E+1	2.0E+2	1.1E+2
Highest 1h In/Out	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.00
Time of highest 1h Outdoor	11/25/14 21:50	11/26/14 23:35	11/27/14 22:42	11/28/14 20:27	11/29/14 21:14	11/30/14 21:39	12/1/14 22:06		
Corresponding highest 1h Indoor	11/25/14 22:28	11/26/14 23:53	11/28/14 0:33	11/28/14 22:01	11/29/14 21:46	11/30/14 21:57	12/1/14 22:35		

¹ Based on 24h periods starting / ending at noon. Day 1 starts at 11/25/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-7-D-4. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6–100 nm based on difference between concentrations measured using the TSI 3787 CPC and the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	8.0E+3	6.7E+3	7.7E+3	5.4E+3	4.8E+3	3.2E+3	2.5E+3	5.5E+3	2.0E+3
Outdoor 24 SD	4.6E+3	3.8E+3	7.1E+3	3.2E+3	2.7E+3	1.8E+3	1.5E+3	3.5E+3	1.8E+3
Indoor 24h mean	3.2E+2	2.4E+2	2.7E+2	1.4E+2	1.3E+2	9.7E+1	7.2E+1	1.8E+2	8.8E+1
Indoor 24 SD	1.9E+2	1.4E+2	1.7E+2	7.8E+1	6.8E+1	4.3E+1	3.0E+1	1.0E+2	5.9E+1
24h mean In/Out	0.03	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.00
Highest 8h Outdoor	9.1E+3	1.1E+4	1.1E+4	8.3E+3	7.1E+3	4.9E+3	3.5E+3	7.8E+3	2.6E+3
Highest 8h Indoor	4.1E+2	3.9E+2	3.9E+2	2.2E+2	2.0E+2	1.4E+2	1.0E+2	2.6E+2	1.2E+2
Highest 8 h In/Out	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.01
Highest 1h Outdoor	1.8E+4	1.4E+4	1.6E+4	1.4E+4	1.1E+4	7.6E+3	5.1E+3	1.2E+4	4.3E+3
Highest 1 h Indoor ²	4.1E+2	3.9E+2	3.9E+2	2.2E+2	2.0E+2	1.4E+2	1.0E+2	4.2E+2	2.1E+2
Highest 1h In/Out	0.04	0.03	0.04	0.03	0.03	0.03	0.02	0.03	0.01
Time of highest 1h Outdoor	11/26/14 8:22	11/26/14 22:18	11/28/14 6:13	11/28/14 18:12	11/29/14 21:29	11/30/14 19:46	12/1/14 16:52		
Corresponding highest 1h Indoor	11/26/14 8:39	11/26/14 23:44	11/28/14 7:51	11/28/14 18:45	11/29/14 21:47	11/30/14 21:49	12/1/14 18:36		

¹ Based on 24h periods starting / ending at noon. Day 1 starts at 11/25/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-7-D-5. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100–300 nm based on difference between concentrations measured using the TSI 3781 CPC with size selector and the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	5.7E+6	5.3E+6	5.2E+6	1.9E+6	1.7E+6	1.7E+6	9.9E+5	3.2E+6	1.9E+6
Outdoor 24 SD	1.9E+6	2.6E+6	3.8E+6	1.3E+6	1.2E+6	1.0E+6	3.3E+5	1.7E+6	1.1E+6
Indoor 24h mean	2.3E+5	1.7E+5	1.8E+5	5.6E+4	5.0E+4	5.4E+4	3.4E+4	1.1E+5	7.5E+4
Indoor 24 SD	1.3E+5	9.0E+4	1.2E+5	3.5E+4	3.3E+4	2.5E+4	9.4E+3	6.4E+4	4.6E+4
24h mean In/Out	0.03	0.04	0.03	0.04	0.03	0.03	0.03	0.03	0.00
Highest 8h Outdoor	7.1E+6	8.3E+6	9.5E+6	3.6E+6	3.0E+6	2.8E+6	1.3E+6	5.1E+6	2.9E+6
Highest 8h Indoor	2.5E+5	2.6E+5	3.0E+5	1.8E+5	8.8E+4	8.1E+4	4.2E+4	1.7E+5	9.4E+4
Highest 8 h In/Out	0.04	0.03	0.03	0.05	0.03	0.03	0.03	0.03	0.01
Highest 1h Outdoor	7.8E+6	1.1E+7	1.4E+7	4.9E+6	5.7E+6	4.8E+6	1.7E+6	7.1E+6	3.7E+6
Highest 1 h Indoor ²	2.5E+5	2.6E+5	3.0E+5	1.8E+5	8.8E+4	8.1E+4	4.2E+4	2.0E+5	1.1E+5
Highest 1h In/Out	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.00
Time of highest 1h Outdoor	11/25/14 21:50	11/26/14 23:35	11/27/14 22:42	11/28/14 20:27	11/29/14 21:14	11/30/14 21:39	12/1/14 22:06		
Corresponding highest 1h Indoor	11/25/14 22:29	11/26/14 23:53	11/28/14 0:33	11/28/14 22:01	11/29/14 21:46	11/30/14 21:57	12/1/14 22:35		

¹ Based on 24h periods starting / ending at noon. Day 1 starts at 11/25/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-7-D-6. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.3–0.4 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	8.9E+4	9.4E+4	9.6E+4	6.8E+4	2.7E+4	5.0E+4	3.7E+4	6.6E+4	2.6E+4
Outdoor 24 SD	2.7E+4	2.8E+4	3.0E+4	2.6E+4	1.4E+4	1.5E+4	1.1E+4	2.1E+4	7.4E+3
Indoor 24h mean	3.9E+3	3.0E+3	3.3E+3	1.4E+3	5.9E+2	8.7E+2	5.6E+2	1.9E+3	1.3E+3
Indoor 24 SD	2.7E+3	1.9E+3	2.1E+3	7.1E+2	2.7E+2	3.5E+2	1.8E+2	1.2E+3	9.5E+2
24h mean In/Out	0.03	0.04	0.03	0.03	0.02	0.02	0.02	0.03	0.01
Highest 8h Outdoor	1.0E+5	1.2E+5	1.3E+5	9.7E+4	6.1E+4	5.7E+4	5.5E+4	8.9E+4	2.9E+4
Highest 8h Indoor	5.9E+3	4.7E+3	5.1E+3	3.5E+3	1.2E+3	1.1E+3	7.7E+2	3.2E+3	2.0E+3
Highest 8 h In/Out	0.06	0.04	0.04	0.04	0.02	0.02	0.01	0.03	0.01
Highest 1h Outdoor	1.2E+5	1.4E+5	1.5E+5	1.1E+5	5.1E+4	8.3E+4	5.6E+4	1.0E+5	3.5E+4
Highest 1 h Indoor ²	5.9E+3	4.7E+3	5.1E+3	3.5E+3	1.2E+3	1.1E+3	7.7E+2	3.1E+3	2.0E+3
Highest 1h In/Out	0.03	0.04	0.04	0.03	0.02	0.02	0.01	0.03	0.01
Time of highest 1h Outdoor	11/25/14 21:06	11/26/14 23:45	11/28/14 0:45	11/28/14 20:23	11/29/14 21:18	11/30/14 22:03	12/2/14 2:42		
Corresponding highest 1h Indoor	11/26/14 0:50	11/27/14 0:45	11/28/14 0:57	11/28/14 21:07	11/29/14 21:52	11/30/14 22:50	12/2/14 2:58		

¹ Based on 24h periods starting / ending at noon. Day 1 starts at 11/25/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-7-D-7. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.4–0.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.8E+4	2.0E+4	2.3E+4	2.0E+4	5.0E+3	8.6E+3	5.6E+3	1.4E+4	7.1E+3
Outdoor 24 SD	6.3E+3	8.7E+3	7.9E+3	1.1E+4	2.8E+3	3.0E+3	1.8E+3	6.0E+3	3.3E+3
Indoor 24h mean	5.9E+2	4.5E+2	4.9E+2	2.2E+2	9.0E+1	1.3E+2	8.2E+1	2.9E+2	2.0E+2
Indoor 24 SD	4.1E+2	2.9E+2	3.0E+2	1.2E+2	4.1E+1	4.9E+1	2.9E+1	1.8E+2	1.4E+2
24h mean In/Out	0.02	0.03	0.02	0.02	0.01	0.02	0.01	0.02	0.01
Highest 8h Outdoor	2.2E+4	2.9E+4	2.9E+4	3.1E+4	1.9E+4	9.5E+3	9.5E+3	2.1E+4	8.4E+3
Highest 8h Indoor	7.5E+2	7.0E+2	6.9E+2	3.4E+2	1.9E+2	1.1E+2	1.1E+2	4.2E+2	2.7E+2
Highest 8 h In/Out	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.01
Highest 1h Outdoor	2.9E+4	3.5E+4	3.7E+4	4.6E+4	1.1E+4	1.5E+4	9.7E+3	2.6E+4	1.3E+4
Highest 1 h Indoor ²	7.5E+2	7.0E+2	6.9E+2	3.4E+2	1.9E+2	1.1E+2	1.1E+2	4.6E+2	2.9E+2
Highest 1h In/Out	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.02	0.01
Time of highest 1h Outdoor	11/25/14 21:06	11/26/14 23:46	11/27/14 23:46	11/28/14 20:23	11/29/14 12:00	11/30/14 22:04	12/2/14 2:43		
Corresponding highest 1h Indoor	11/26/14 0:15	11/27/14 0:48	11/28/14 0:35	11/28/14 21:03	11/29/14 12:00	11/30/14 22:54	12/2/14 3:02		

¹ Based on 24h periods starting / ending at noon. Day 1 starts at 11/25/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-7-D-8. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.5–0.7 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	9.9E+3	1.1E+4	1.5E+4	1.4E+4	2.5E+3	3.8E+3	2.4E+3	8.4E+3	5.1E+3
Outdoor 24 SD	3.8E+3	6.0E+3	6.3E+3	8.8E+3	1.4E+3	1.5E+3	6.5E+2	4.1E+3	2.8E+3
Indoor 24h mean	3.0E+2	2.3E+2	2.7E+2	1.2E+2	4.3E+1	5.6E+1	4.0E+1	1.5E+2	1.0E+2
Indoor 24 SD	2.1E+2	1.5E+2	1.6E+2	7.5E+1	2.1E+1	2.4E+1	1.7E+1	9.3E+1	7.3E+1
24h mean In/Out	0.02	0.03	0.02	0.02	0.01	0.02	0.02	0.02	0.00
Highest 8h Outdoor	1.2E+4	1.7E+4	2.1E+4	2.2E+4	1.4E+4	4.5E+3	3.7E+3	1.3E+4	6.7E+3
Highest 8h Indoor	3.8E+2	3.6E+2	3.7E+2	2.0E+2	1.1E+2	5.4E+1	4.8E+1	2.2E+2	1.4E+2
Highest 8 h In/Out	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.01
Highest 1h Outdoor	1.8E+4	2.0E+4	2.4E+4	3.5E+4	7.2E+3	6.7E+3	3.4E+3	1.6E+4	1.0E+4
Highest 1 h Indoor ²	3.8E+2	3.6E+2	3.7E+2	2.0E+2	1.1E+2	5.4E+1	4.8E+1	2.5E+2	1.6E+2
Highest 1h In/Out	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.02	0.00
Time of highest 1h Outdoor	11/25/14 21:07	11/26/14 23:47	11/27/14 22:45	11/28/14 20:24	11/29/14 12:00	11/30/14 22:06	12/2/14 2:32		
Corresponding highest 1h Indoor	11/25/14 21:52	11/27/14 0:44	11/28/14 0:06	11/28/14 20:54	11/29/14 12:00	11/30/14 23:03	12/2/14 3:21		

¹ Based on 24h periods starting / ending at noon. Day 1 starts at 11/25/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-7-D-9. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.7–1.0 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	1.8E+3	1.7E+3	2.9E+3	3.2E+3	4.0E+2	5.3E+2	3.2E+2	1.5E+3	1.1E+3
Outdoor 24 SD	7.3E+2	1.1E+3	1.7E+3	2.2E+3	1.9E+2	2.9E+2	1.4E+2	9.1E+2	7.4E+2
Indoor 24h mean	5.1E+1	3.7E+1	4.3E+1	2.8E+1	7.7E+0	9.9E+0	7.7E+0	2.6E+1	1.7E+1
Indoor 24 SD	3.4E+1	2.6E+1	2.8E+1	1.7E+1	3.8E+0	4.5E+0	4.0E+0	1.7E+1	1.2E+1
24h mean In/Out	0.02	0.03	0.02	0.01	0.01	0.02	0.02	0.02	0.00
Highest 8h Outdoor	2.2E+3	2.8E+3	4.9E+3	4.7E+3	3.4E+3	7.2E+2	4.2E+2	2.8E+3	1.6E+3
Highest 8h Indoor	5.7E+1	5.8E+1	5.7E+1	4.3E+1	2.6E+1	1.1E+1	1.0E+1	3.8E+1	2.0E+1
Highest 8 h In/Out	0.03	0.02	0.01	0.01	0.01	0.02	0.02	0.02	0.01
Highest 1h Outdoor	3.4E+3	3.5E+3	5.6E+3	9.0E+3	1.6E+3	1.0E+3	7.6E+2	3.6E+3	2.7E+3
Highest 1 h Indoor ²	5.7E+1	5.8E+1	5.7E+1	4.3E+1	2.6E+1	1.1E+1	1.0E+1	4.1E+1	2.3E+1
Highest 1h In/Out	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.00
Time of highest 1h Outdoor	11/25/14 21:08	11/26/14 20:19	11/27/14 17:06	11/28/14 20:21	11/29/14 12:00	11/30/14 14:00	12/1/14 20:30		
Corresponding highest 1h Indoor	11/25/14 21:52	11/27/14 0:19	11/27/14 21:00	11/28/14 21:04	11/29/14 12:00	11/30/14 14:47	12/1/14 21:08		

¹ Based on 24h periods starting / ending at noon. Day 1 starts at 11/25/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-7-D-10. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 1.0–2.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	8.9E+2	7.8E+2	9.1E+2	1.4E+3	2.2E+2	2.9E+2	1.9E+2	6.6E+2	4.1E+2
Outdoor 24 SD	3.0E+2	4.4E+2	4.1E+2	8.4E+2	7.8E+1	1.9E+2	9.7E+1	3.3E+2	2.4E+2
Indoor 24h mean	2.2E+1	1.5E+1	1.5E+1	1.3E+1	3.8E+0	5.2E+0	4.2E+0	1.1E+1	6.5E+0
Indoor 24 SD	1.5E+1	1.1E+1	9.3E+0	6.9E+0	2.2E+0	2.8E+0	2.5E+0	7.0E+0	4.5E+0
24h mean In/Out	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.00
Highest 8h Outdoor	1.1E+3	1.3E+3	1.4E+3	1.8E+3	1.5E+3	4.4E+2	2.6E+2	1.1E+3	5.2E+2
Highest 8h Indoor	2.5E+1	2.3E+1	2.0E+1	1.8E+1	1.1E+1	6.1E+0	5.1E+0	1.6E+1	7.5E+0
Highest 8 h In/Out	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.00
Highest 1h Outdoor	1.4E+3	1.6E+3	1.5E+3	3.7E+3	6.6E+2	6.3E+2	4.8E+2	1.4E+3	1.0E+3
Highest 1 h Indoor ²	2.5E+1	2.3E+1	2.0E+1	1.8E+1	1.1E+1	6.1E+0	5.1E+0	1.8E+1	8.6E+0
Highest 1h In/Out	0.02	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0.00
Time of highest 1h Outdoor	11/25/14 21:08	11/26/14 23:53	11/27/14 23:08	11/28/14 20:21	11/29/14 12:00	11/30/14 19:47	12/1/14 20:27		
Corresponding highest 1h Indoor	11/26/14 0:26	11/27/14 0:40	11/28/14 0:04	11/28/14 20:43	11/29/14 12:00	11/30/14 23:14	12/1/14 21:09		

¹ Based on 24h periods starting / ending at noon. Day 1 starts at 11/25/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-7-D-11. Summary statistics for estimated PM_{2.5} concentrations ($\mu\text{g m}^{-3}$) calculated from particle number concentrations resolved by size from 6 nm to 2.5 microns (as reported in Tables FW-7-D-2 to FW-7-D-9) and resulting indoor/outdoor ratios.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	3.8E+1	3.6E+1	3.9E+1	2.7E+1	1.1E+1	1.3E+1	8.4E+0	2.5E+1	1.3E+1
Outdoor 24 SD	1.2E+1	1.7E+1	1.8E+1	1.4E+1	6.1E+0	5.9E+0	1.8E+0	1.1E+1	5.7E+0
Indoor 24h mean	1.4E+0	1.1E+0	1.1E+0	4.4E-1	2.8E-1	3.3E-1	2.1E-1	6.9E-1	4.5E-1
Indoor 24 SD	8.6E-1	5.9E-1	6.9E-1	2.4E-1	1.6E-1	1.4E-1	6.3E-2	3.9E-1	2.9E-1
24h mean In/Out	0.03	0.03	0.03	0.03	0.02	0.02	0.03	0.03	0.00
Highest 8h Outdoor	4.6E+1	5.5E+1	5.9E+1	3.9E+1	2.3E+1	1.9E+1	9.8E+0	3.6E+1	1.8E+1
Highest 8h Indoor	1.6E+0	1.6E+0	1.7E+0	7.0E-1	3.0E-1	4.6E-1	2.4E-1	9.4E-1	6.1E-1
Highest 8 h In/Out	0.03	0.03	0.03	0.02	0.01	0.02	0.02	0.02	0.01
Highest 1h Outdoor	5.5E+1	7.0E+1	8.2E+1	6.7E+1	3.0E+1	2.9E+1	1.3E+1	4.9E+1	2.4E+1
Highest 1 h Indoor ²	1.6E+0	1.6E+0	1.7E+0	7.0E-1	3.0E-1	4.6E-1	2.4E-1	1.2E+0	6.5E-1
Highest 1h In/Out	0.03	0.03	0.03	0.01	0.02	0.02	0.02	0.02	0.00
Time of highest 1h Outdoor	11/25/14 21:07	11/26/14 23:35	11/27/14 22:43	11/28/14 20:25	11/29/14 21:14	11/30/14 21:39	12/1/14 20:43		
Corresponding highest 1h Indoor	11/25/14 22:15	11/27/14 0:00	11/28/14 0:34	11/28/14 21:05	11/29/14 21:47	11/30/14 22:28	12/1/14 22:33		

¹ Based on 24h periods starting / ending at noon. Day 1 starts at 11/25/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-7-D-12. Summary statistics for concentrations of PM_{2.5} ($\mu\text{g m}^{-3}$) and indoor /outdoor ratios from measurements reported by TSI DustTrak II.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	7.6E-2	7.9E-2	8.3E-2	5.3E-2	1.2E-2	2.5E-2	1.8E-2	4.9E-2	2.8E-2
Outdoor 24 SD	2.7E-2	3.7E-2	3.4E-2	3.1E-2	8.7E-3	9.5E-3	4.3E-3	2.2E-2	1.3E-2
Indoor 24h mean	2.0E-3	1.4E-3	1.6E-3	1.6E-3	1.3E-3	2.1E-3	1.3E-3	1.6E-3	2.8E-4
Indoor 24 SD	1.5E-3	6.5E-4	7.8E-4	7.4E-4	5.5E-4	1.1E-3	3.9E-4	8.2E-4	3.5E-4
24h mean In/Out	0.02	0.02	0.02	0.02	0.06	0.10	0.07	0.04	0.03
Highest 8h Outdoor	9.3E-2	1.2E-1	1.2E-1	8.3E-2	4.3E-2	3.2E-2	2.5E-2	7.4E-2	3.8E-2
Highest 8h Indoor	3.1E-3	1.6E-3	1.8E-3	1.3E-3	2.1E-3	2.4E-3	1.4E-3	1.9E-3	5.7E-4
Highest 8 h In/Out	0.03	0.01	0.01	0.02	0.05	0.08	0.06	0.04	0.02
Highest 1h Outdoor	1.1E-1	1.5E-1	1.6E-1	1.4E-1	3.3E-2	5.1E-2	2.6E-2	9.5E-2	5.3E-2
Highest 1 h Indoor ²	3.1E-3	1.6E-3	1.8E-3	1.3E-3	2.1E-3	2.4E-3	1.4E-3	2.3E-3	6.9E-4
Highest 1h In/Out	0.01	0.01	0.02	0.01	0.11	0.06	0.08	0.04	0.04
Time of highest 1h Outdoor	11/25/14 21:07	11/26/14 23:45	11/27/14 23:38	11/28/14 20:22	11/29/14 21:16	11/30/14 22:02	12/1/14 22:30		
Corresponding highest 1h Indoor	11/25/14 21:51	11/27/14 0:47	11/27/14 23:53	11/29/14 0:22	11/29/14 23:24	11/30/14 22:02	12/2/14 1:54		

¹ Based on 24h periods starting / ending at noon. Day 1 starts at 11/25/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-7-D-13. Daily¹ summary statistics for concentrations (nanograms m^{-3}) and indoor /outdoor ratios of aerosol black carbon measured using the Aethalometer AE22.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Day 7	Mean ¹	SD ¹
Outdoor 24h mean	3.0E+3	2.6E+3	2.2E+3	7.3E+2	4.8E+2	5.9E+2	3.1E+2	1.4E+3	1.1E+3
Outdoor 24 SD	1.6E+3	1.6E+3	1.6E+3	4.4E+2	3.2E+2	3.3E+2	1.1E+2	8.5E+2	6.4E+2
Indoor 24h mean	1.5E+2	9.3E+1	1.0E+2	2.1E+1	1.9E+1	2.0E+1	1.8E+1	6.0E+1	4.9E+1
Indoor 24 SD	1.2E+2	7.7E+1	9.1E+1	2.5E+1	1.8E+1	2.0E+1	1.8E+1	5.2E+1	3.8E+1
24h mean In/Out	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.00
Highest 8h Outdoor	3.9E+3	4.4E+3	4.1E+3	1.7E+3	8.0E+2	8.5E+2	4.4E+2	2.3E+3	1.6E+3
Highest 8h Indoor	2.1E+2	1.6E+2	1.9E+2	1.0E+2	2.4E+1	2.5E+1	1.9E+1	1.1E+2	7.8E+1
Highest 8 h In/Out	0.05	0.04	0.05	0.06	0.03	0.03	0.04	0.04	0.01
Highest 1h Outdoor	5.5E+3	5.5E+3	6.1E+3	1.8E+3	1.4E+3	1.4E+3	5.2E+2	3.2E+3	2.2E+3
Highest 1 h Indoor ²	2.1E+2	1.6E+2	1.9E+2	1.0E+2	2.4E+1	2.5E+1	1.9E+1	1.3E+2	8.8E+1
Highest 1h In/Out	0.03	0.04	0.04	0.04	0.05	0.05	0.03	0.04	0.01
Time of highest 1h Outdoor	11/25/14 21:06	11/26/14 23:30	11/28/14 0:03	11/28/14 20:24	11/29/14 21:21	11/30/14 21:54	12/1/14 22:36		
Corresponding highest 1h Indoor	11/26/14 0:03	11/27/14 1:27	11/28/14 2:09	11/28/14 21:54	11/29/14 22:45	11/30/14 22:27	12/1/14 22:36		

¹ Based on 24h periods starting / ending at noon. Day 1 starts at 11/25/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Appendix FW-8-G. Results for System G, December 2-8, 2014.

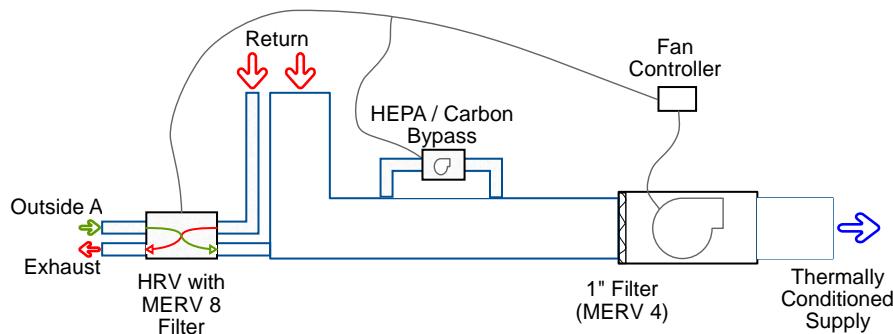


Table FW-8-G-1. Description of **System G** component characteristics during the period of **December 2-8, 2014**

System Parameter	Description or Measured Value
Heating	75,000 BTU/h, 80% eff., gas furnace, 1-stage burner
Cooling	3 ton, SEER13 air conditioner
Thermal distribution	Central fan with PSC motor: 1200 cfm for cooling, 1074 cfm for heating
Ventilation	HRV system (set to deliver 114 cfm when on) that operates with the fan cycler providing 20 min of operation per hour.
Filtration	MERV4, 1" (Purolator F312) filter installed inside the FAU cabinet. HEPA bypass unit (180 cfm Lennox HEPA-20) drawing air from the return plenum and discharging at the entrance to the FAU. The fan cycler operates the HEPA bypass for 20 min out of every hour.
Recirculation blower schedule	As required for thermal conditioning, with fan cycler providing a minimum of 20 minutes per hour.
VOC removal system	Activated carbon canister with the HEPA bypass system.

Notes about this monitoring period

We operated for the entire operational period with a single instrument for the following instruments CPC 3781, aethalometer, and DustTrak. All of the other instruments were functioning normally.

The 24 h running statistics in the figures starts at 12/2/2014 22:00.

There was heavy rain throughout the day of 12/3/2014. There were extended periods of fog on the days of 12/7/2014, and 12/8/2014.

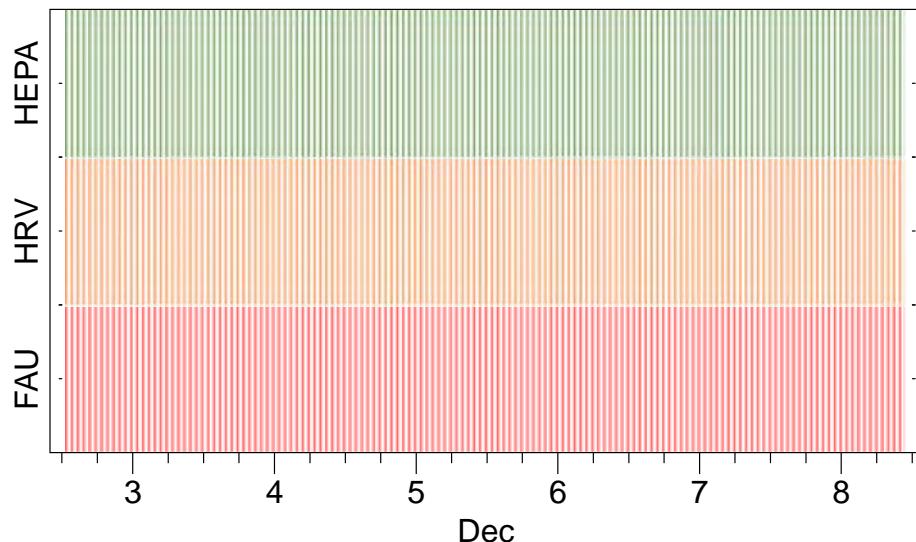


Figure FW-8-G-1. Operation of mechanical systems: HEPA bypass system; HRV system; fan on central forced air unit (FAU).

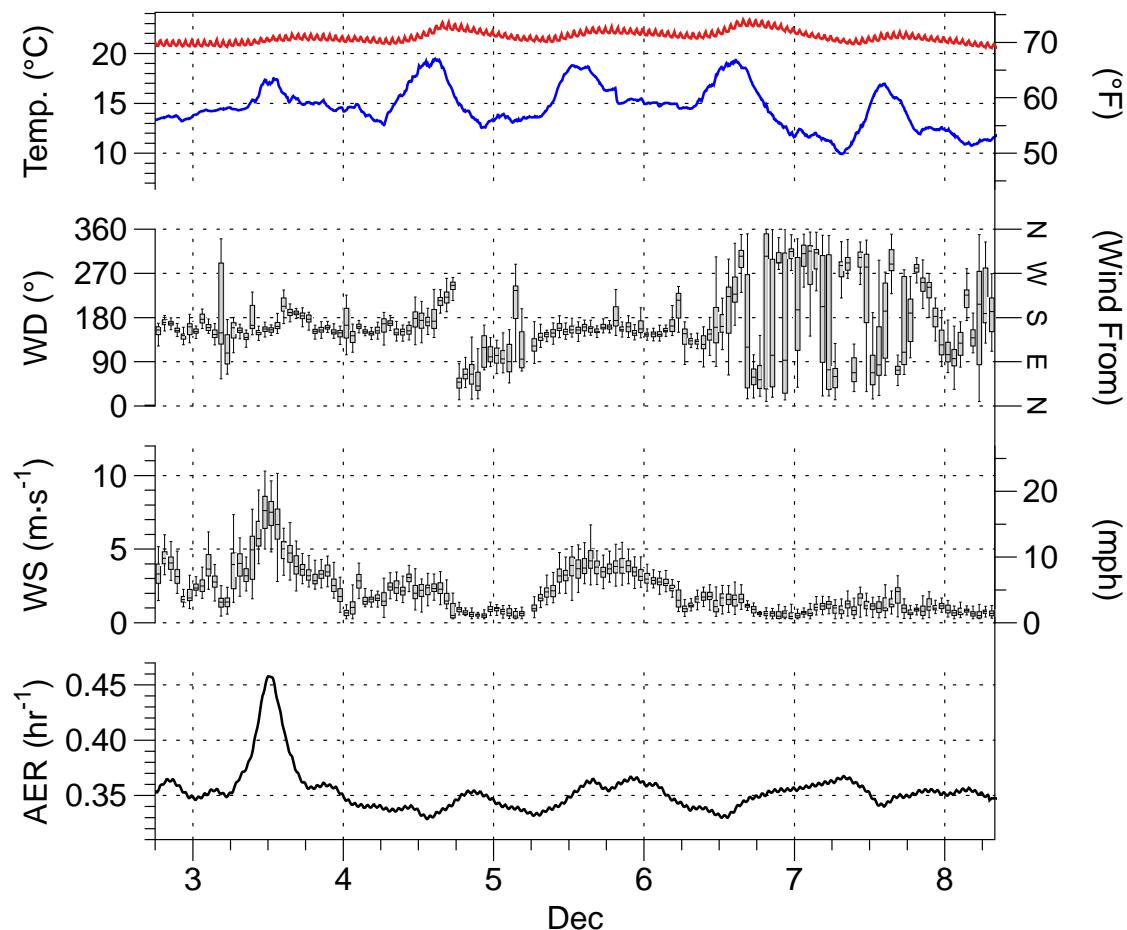


Figure FW-8-G-2. Environmental parameters measured during operation of System G, Dec 2-8, 2014.
 From top to bottom: indoor (red) and outdoor (blue) temperatures, wind direction (WD) in units of degrees from North, wind speed (WS), and air exchange rate (AER). For WD and WS, the box for each hour shows the 25th, 50th and 75th percentiles of the measured values and whiskers extend 1.5X the interquartile range (75th–25th percentile values) above the 75th and below the 25th percentile values.

Guide to plots of pollutant concentration time series and indoor / outdoor (I/O) ratios

The bottom section of each plot shows outdoor and indoor time series using the resolution of data collection: 3-min for black carbon and 1-min for all other parameters. The top and bottom of grey band are LOESS-smoothed, 1-min (or 3-min for black carbon) time-series. Also shown are time series with 1h and 24h time averaging for most pollutants. Triangles in bottom of plot indicate the highest 1h outdoor and corresponding highest 1h indoor average during each day. The top section of each plot shows the ratio of indoor to outdoor running 24h mean values (8h for ozone) and the ratios of highest 1h indoor to corresponding highest 1h outdoor concentration each day.

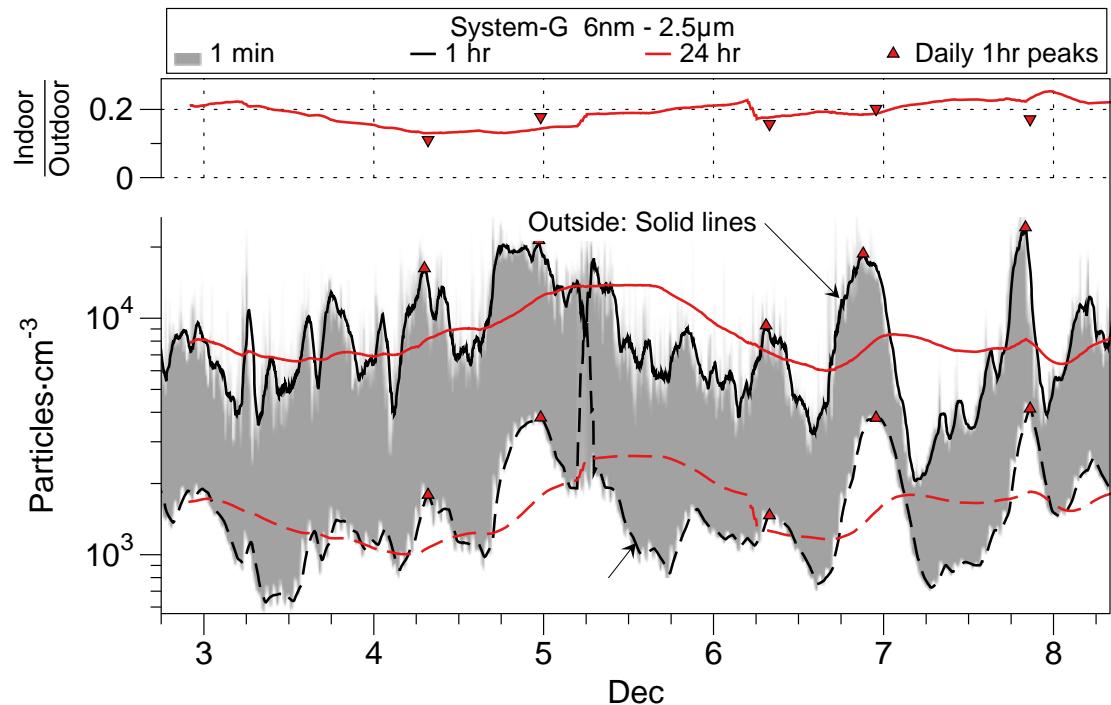


Figure FW-8-G-3. Number concentrations of 6 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of System G, Dec 2-8, 2014. Data collected using TSI 3787 CPCs.

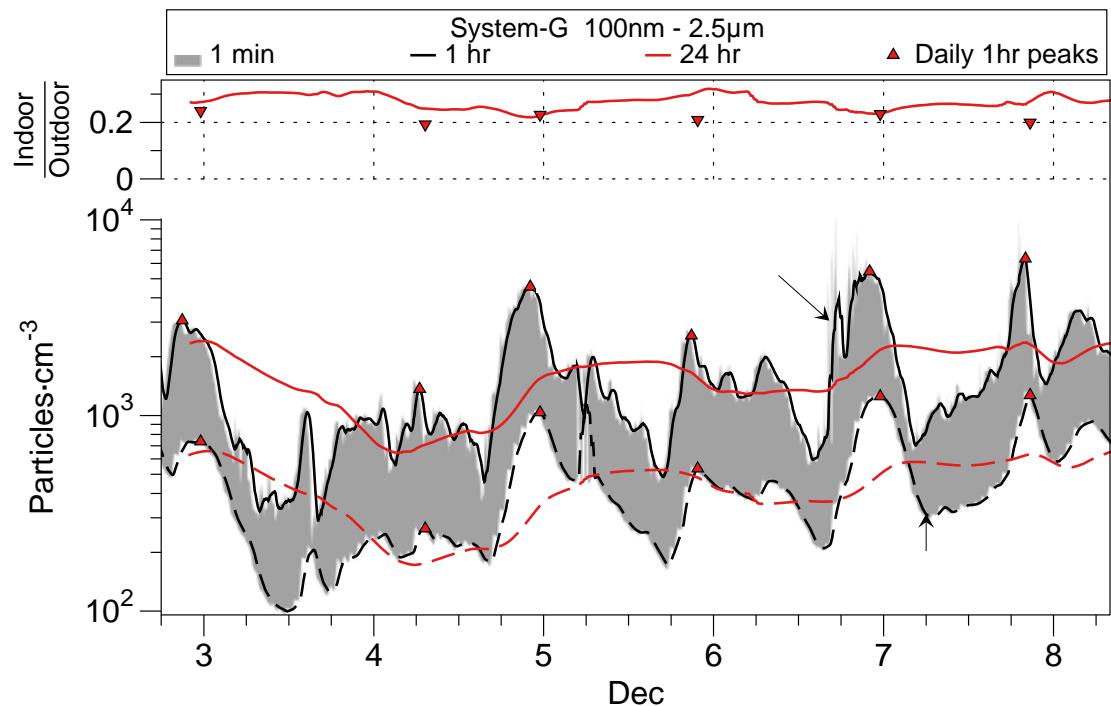


Figure FW-8-G-4. Number concentrations of 100 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of System G, Dec 2-8, 2014. Data collected using TSI 3781 CPCs outfitted with screens to exclude particles smaller than 100 nm. Refer to “Guide” before Figure FW-8-G-3.

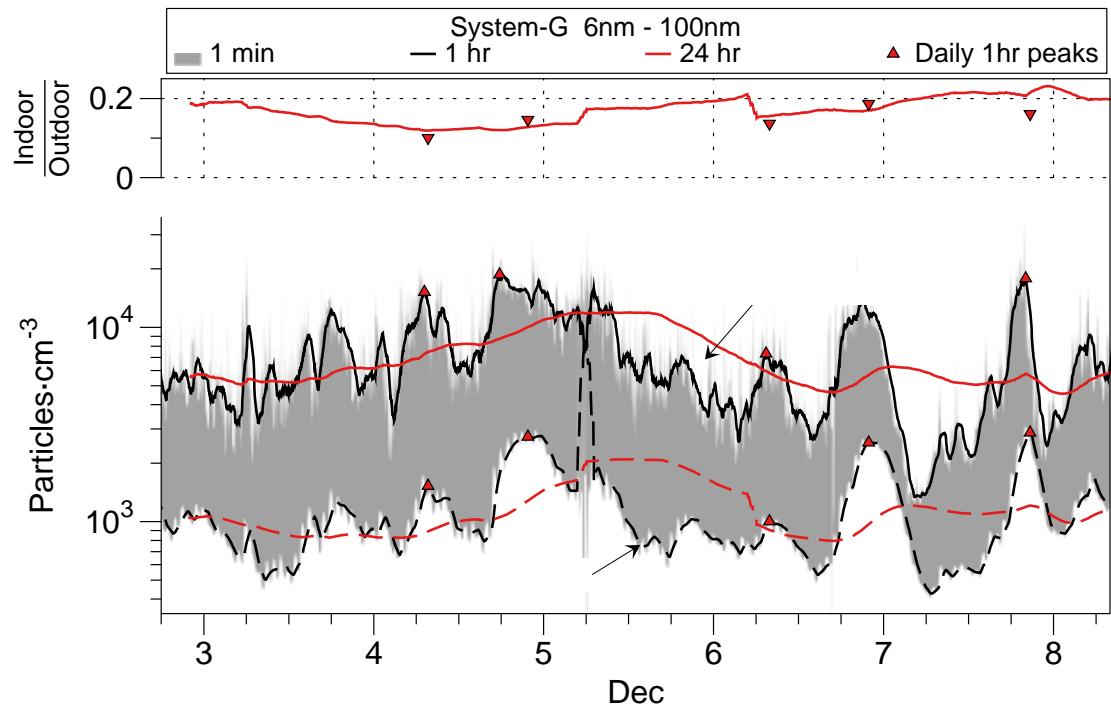


Figure FW-8-G-5. Number concentrations of 6–100 nm diameter particles measured outdoors and indoors during operation of System G, Dec 2–8, 2014. Data obtained as the difference between time series show in prior two figures. Refer to “Guide” before Figure FW-8-G-3.

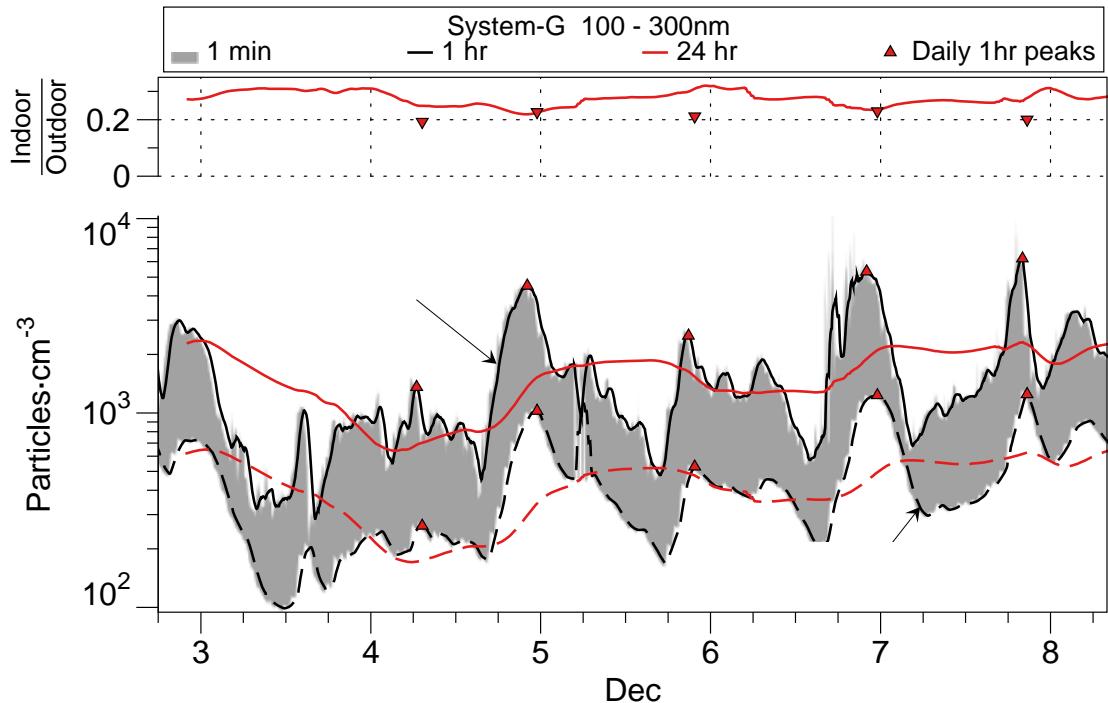


Figure FW-8-G-6. Number concentrations of 100–300 nm diameter particles measured outdoors and indoors during operation of System G, Dec 2–8, 2014. Data obtained as the difference between the TSI 3781 CPC with size selector and the MetOne BT637S OPC. Refer to “Guide” before Figure FW-8-G-3.

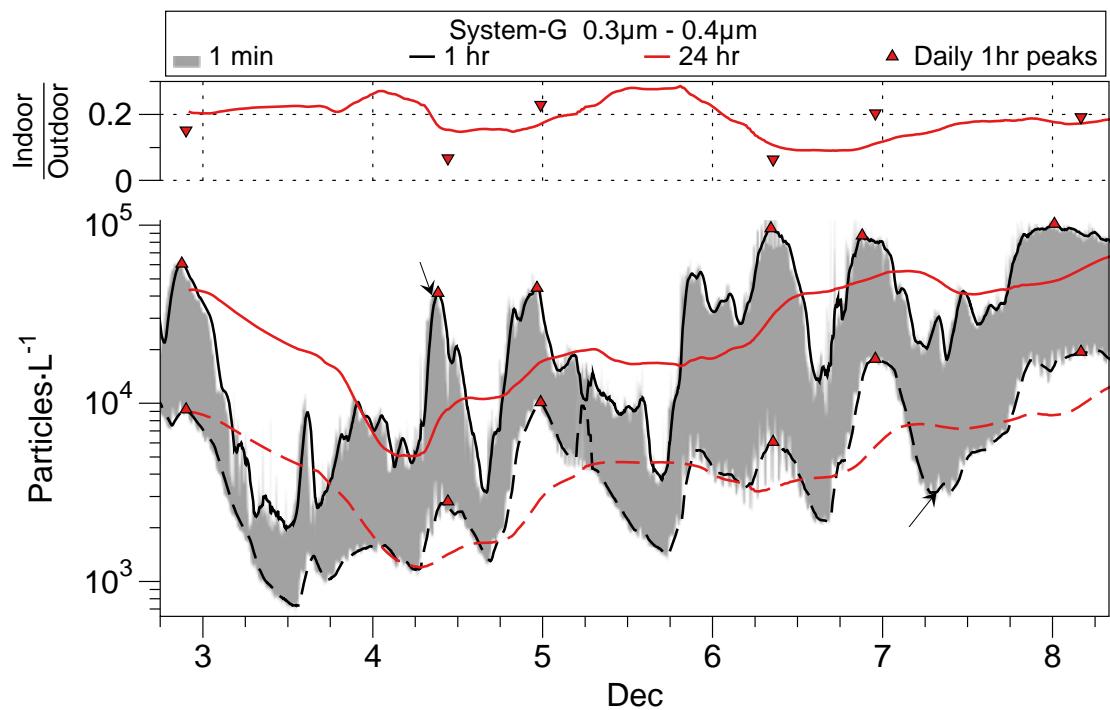


Figure FW-8-G-7. Number concentrations of 0.3–0.4 μm diameter particles measured outdoors and indoors during operation of System G, Dec 2–8, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-8-G-3.

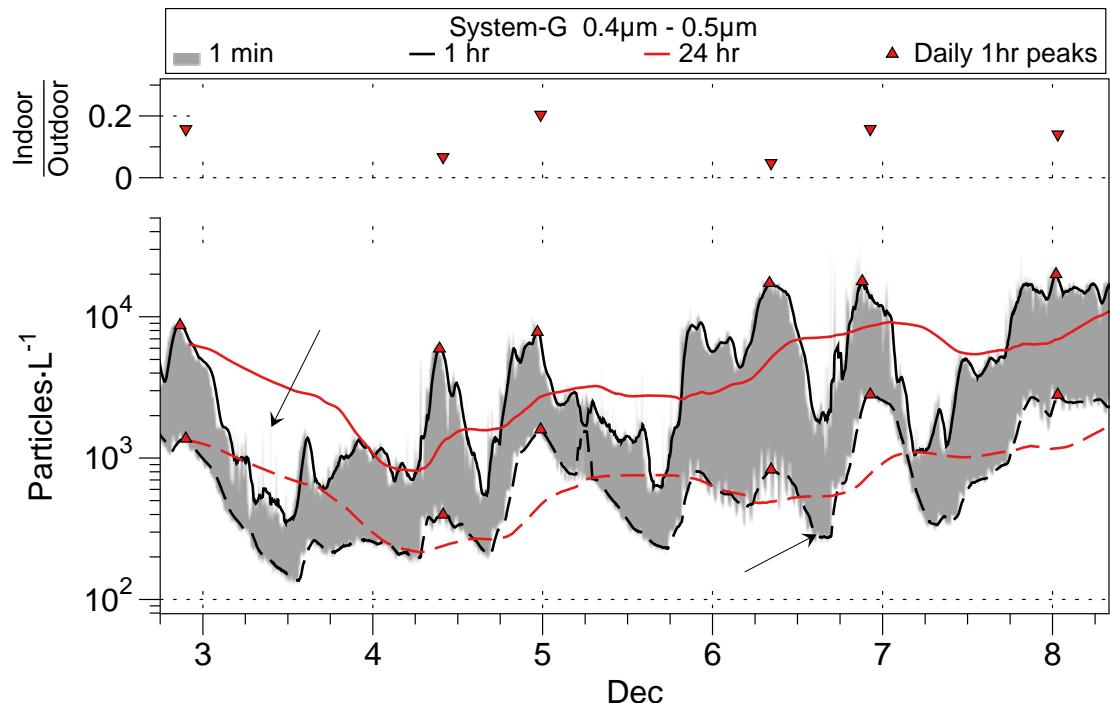


Figure FW-8-G-8. Number concentrations of 0.4–0.5 μm diameter particles measured outdoors and indoors during operation of System G, Dec 2–8, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-8-G-3.

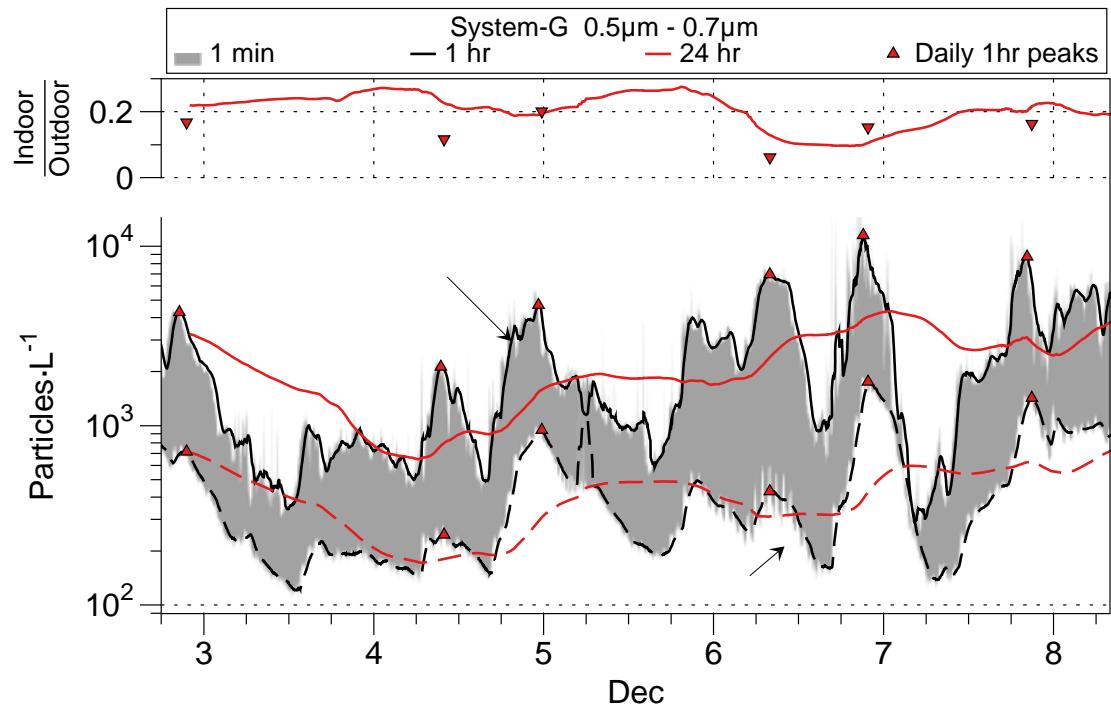


Figure FW-8-G-9. Number concentrations of 0.5–0.7 μm diameter particles measured outdoors and indoors during operation of System G, Dec 2–8, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-8-G-3.

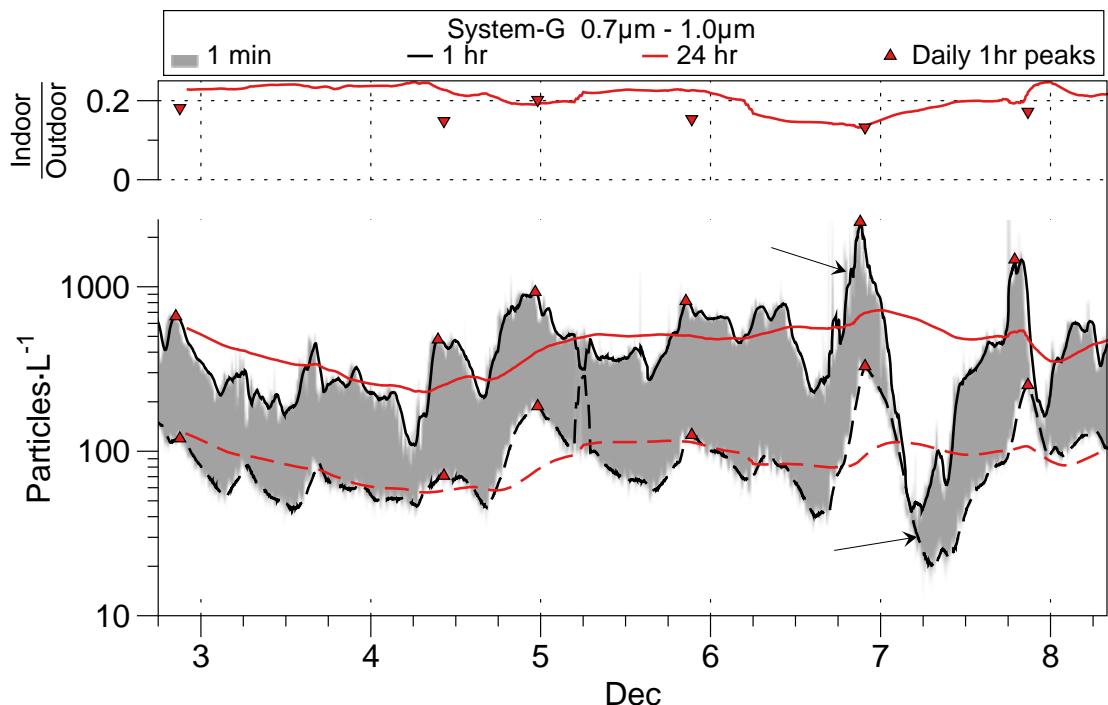


Figure FW-8-G-10. Number concentrations of 0.7–1.0 μm diameter particles measured outdoors and indoors during operation of System G, Dec 2–8, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-8-G-3.

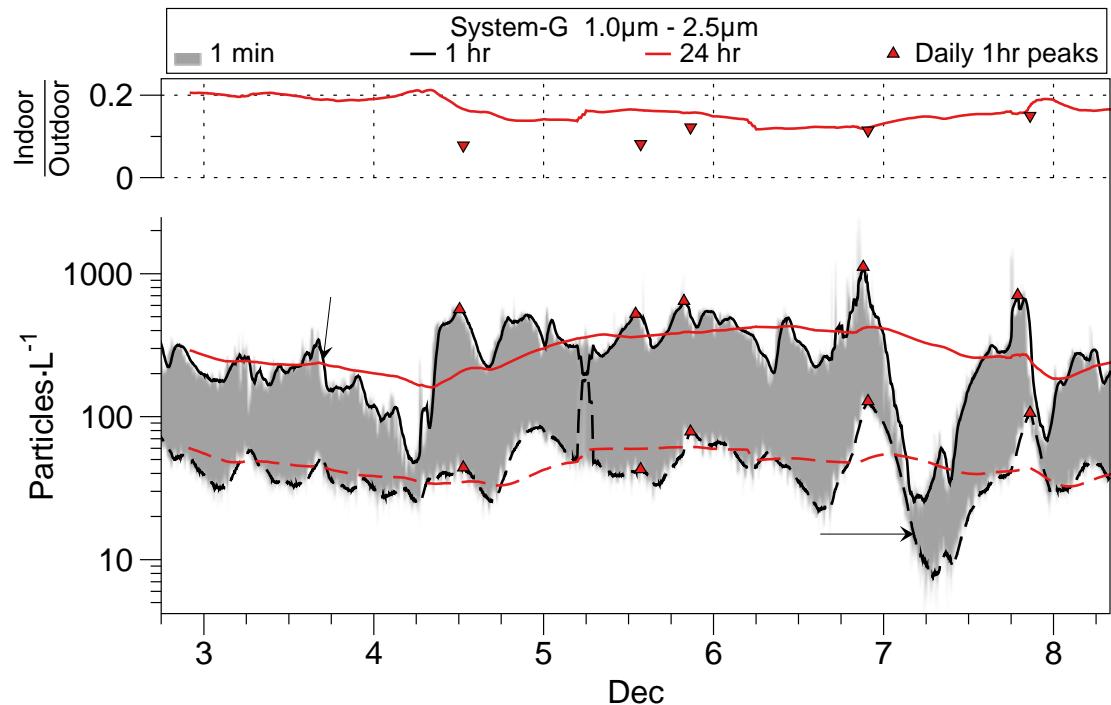


Figure FW-8-G-11. Number concentrations of 1.0–2.5 μm diameter particles measured outdoors and indoors during operation of System G, Dec 2–8, 2014. Data collected using MetOne BT637S particle counters. Refer to Figure FW-8-G-3 for details.

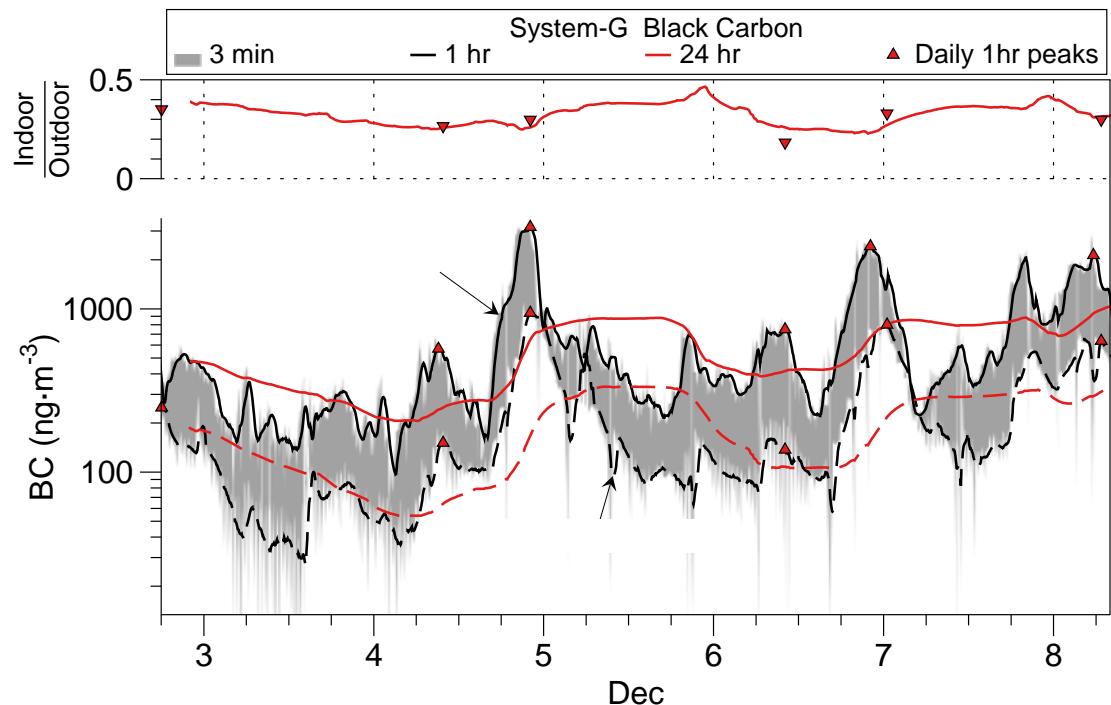


Figure FW-8-G-12. Black carbon concentrations measured outdoors and indoors during operation of System G, Dec 2–8, 2014. Data collected using AE22 Aethalometers with 3-min samples. Data otherwise as described in Figure FW-8-G-3 caption.

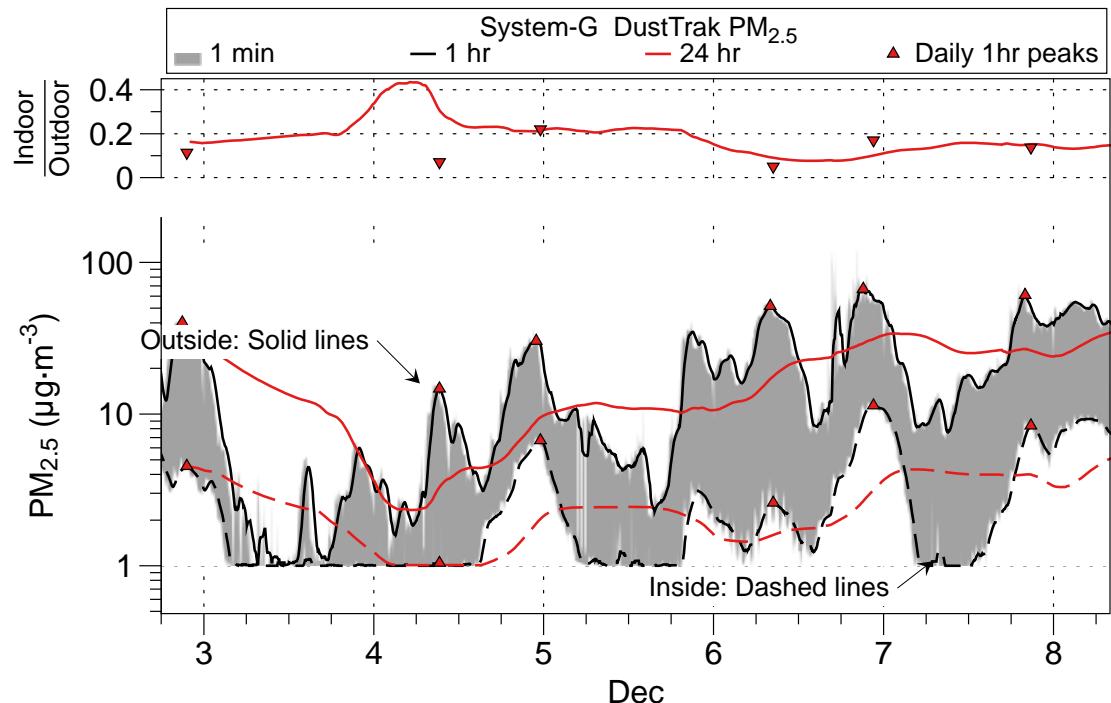


Figure FW-8-G-13. PM_{2.5} reported by TSI DustTrak II 8530 measurements outdoors and indoors during operation of System G, Dec 2-8, 2014. The DustTrak measures light scattering and uses a calibration to estimate PM_{2.5} mass. Refer to “Guide” before Figure FW-8-G-3.

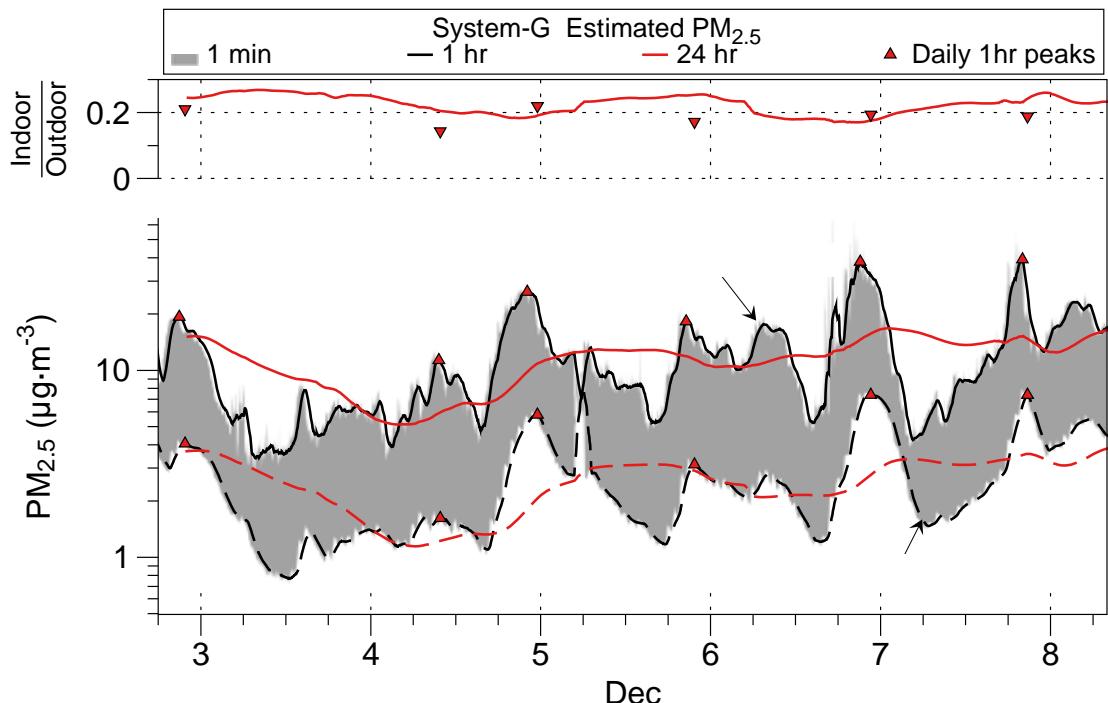


Figure FW-8-G-14. Estimated PM_{2.5} concentration calculated from size-resolved particle number concentrations measured by MetOne and CPC during operation of System G, Dec 2-8, 2014. Details provided in body of report. Refer to “Guide” before Figure FW-8-G-3.

Table FW-8-G-2. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6 nm to 2.5 micron measured using the TSI 3787 CPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Mean ¹	SD ¹
Outdoor 24h mean	6.6E+3	9.1E+3	1.4E+4	6.4E+3	7.2E+3	9.8E+3	8.8E+3	2.6E+3
Outdoor 24 SD	2.6E+3	3.5E+3	5.5E+3	2.2E+3	5.6E+3	5.7E+3	4.2E+3	1.5E+3
Indoor 24h mean	1.3E+3	1.2E+3	2.6E+3	1.2E+3	1.7E+3	2.0E+3	1.7E+3	5.2E+2
Indoor 24 SD	4.7E+2	2.5E+2	2.6E+3	1.9E+2	1.1E+3	8.0E+2	8.9E+2	8.1E+2
24h mean In/Out	0.21	0.15	0.16	0.20	0.20	0.23	0.19	0.03
Highest 8h Outdoor	1.3E+4	1.1E+4	1.9E+4	1.1E+4	1.4E+4	1.2E+4	1.3E+4	2.8E+3
Highest 8h Indoor	1.9E+3	1.4E+3	3.2E+3	2.4E+3	3.0E+3	2.5E+3	2.4E+3	6.3E+2
Highest 8 h In/Out	0.14	0.12	0.17	0.22	0.21	0.21	0.18	0.04
Highest 1h Outdoor	1.3E+4	1.6E+4	2.1E+4	9.3E+3	1.9E+4	2.4E+4	1.7E+4	5.0E+3
Highest 1 h Indoor ²	1.9E+3	1.4E+3	3.2E+3	2.4E+3	3.0E+3	2.5E+3	2.8E+3	1.1E+3
Highest 1h In/Out	0.15	0.11	0.18	0.16	0.20	0.17	0.16	0.03
Time of highest 1h Outdoor	12/2/14 16:23	12/4/14 7:10	12/4/14 23:20	12/6/14 7:25	12/6/14 21:07	12/7/14 20:03		
Corresponding highest 1h Indoor	12/2/14 17:37	12/4/14 7:40	12/4/14 23:34	12/6/14 7:53	12/6/14 22:56	12/7/14 20:41		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/2/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-8-G-3. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100 nm to 2.5 micron measured using the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Mean ¹	SD ¹
Outdoor 24h mean	1.4E+3	8.3E+2	1.9E+3	1.3E+3	2.1E+3	2.6E+3	1.7E+3	5.9E+2
Outdoor 24 SD	9.9E+2	2.4E+2	1.2E+3	5.2E+2	1.7E+3	1.2E+3	9.8E+2	4.9E+2
Indoor 24h mean	4.2E+2	2.0E+2	5.2E+2	3.6E+2	5.6E+2	7.3E+2	4.7E+2	1.6E+2
Indoor 24 SD	2.5E+2	3.9E+1	3.2E+2	1.0E+2	3.5E+2	2.3E+2	2.2E+2	1.1E+2
24h mean In/Out	0.29	0.28	0.25	0.29	0.25	0.28	0.27	0.02
Highest 8h Outdoor	2.7E+3	9.5E+2	3.2E+3	1.8E+3	4.2E+3	3.0E+3	2.6E+3	1.0E+3
Highest 8h Indoor	6.8E+2	2.4E+2	7.8E+2	4.5E+2	1.0E+3	8.3E+2	6.6E+2	2.5E+2
Highest 8 h In/Out	0.26	0.25	0.24	0.26	0.24	0.27	0.25	0.01
Highest 1h Outdoor	3.1E+3	1.4E+3	4.6E+3	2.6E+3	5.5E+3	6.3E+3	3.9E+3	1.7E+3
Highest 1 h Indoor ²	6.8E+2	2.4E+2	7.8E+2	4.5E+2	1.0E+3	8.3E+2	8.5E+2	3.7E+2
Highest 1h In/Out	0.24	0.19	0.23	0.21	0.23	0.20	0.22	0.02
Time of highest 1h Outdoor	12/2/14 20:58	12/4/14 6:29	12/4/14 22:06	12/5/14 20:52	12/6/14 22:02	12/7/14 20:02		
Corresponding highest 1h Indoor	12/2/14 23:34	12/4/14 7:17	12/4/14 23:30	12/5/14 21:45	12/6/14 23:32	12/7/14 20:42		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/2/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-8-G-4. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6–100 nm based on difference between concentrations measured using the TSI 3787 CPC and the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Mean ¹	SD ¹
Outdoor 24h mean	5.2E+3	8.2E+3	1.2E+4	5.0E+3	5.1E+3	7.1E+3	7.1E+3	2.5E+3
Outdoor 24 SD	2.3E+3	3.5E+3	4.8E+3	2.0E+3	4.1E+3	4.7E+3	3.6E+3	1.1E+3
Indoor 24h mean	8.4E+2	1.0E+3	2.1E+3	8.2E+2	1.1E+3	1.3E+3	1.2E+3	4.3E+2
Indoor 24 SD	2.3E+2	2.4E+2	2.3E+3	1.2E+2	7.4E+2	5.8E+2	7.0E+2	7.5E+2
24h mean In/Out	0.18	0.13	0.14	0.18	0.19	0.21	0.17	0.03
Highest 8h Outdoor	1.0E+4	1.0E+4	1.6E+4	9.9E+3	1.0E+4	8.7E+3	1.1E+4	2.3E+3
Highest 8h Indoor	1.2E+3	1.2E+3	2.5E+3	2.0E+3	2.0E+3	1.7E+3	1.8E+3	4.7E+2
Highest 8 h In/Out	0.12	0.11	0.16	0.20	0.20	0.19	0.16	0.04
Highest 1h Outdoor	1.0E+4	1.5E+4	1.9E+4	7.3E+3	1.4E+4	1.8E+4	1.4E+4	4.0E+3
Highest 1 h Indoor ²	1.2E+3	1.2E+3	2.5E+3	2.0E+3	2.0E+3	1.7E+3	2.0E+3	7.5E+2
Highest 1h In/Out	0.12	0.10	0.15	0.14	0.19	0.16	0.14	0.03
Time of highest 1h Outdoor	12/2/14 16:23	12/4/14 7:10	12/4/14 17:46	12/6/14 7:25	12/6/14 21:07	12/7/14 20:04		
Corresponding highest 1h Indoor	12/2/14 17:39	12/4/14 7:40	12/4/14 21:46	12/6/14 7:53	12/6/14 21:53	12/7/14 20:41		

¹Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/2/2014 22:00, and has <24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-8-G-5. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100–300 nm based on difference between concentrations measured using the TSI 3781 CPC with size selector and the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Mean ¹	SD ¹
Outdoor 24h mean	1.3E+6	8.2E+5	1.8E+6	1.3E+6	2.1E+6	2.5E+6	1.7E+6	5.7E+5
Outdoor 24 SD	9.6E+5	2.3E+5	1.2E+6	5.0E+5	1.7E+6	1.2E+6	9.6E+5	4.8E+5
Indoor 24h mean	4.1E+5	2.0E+5	5.2E+5	3.6E+5	5.5E+5	7.1E+5	4.6E+5	1.6E+5
Indoor 24 SD	2.4E+5	3.9E+4	3.2E+5	1.0E+5	3.4E+5	2.3E+5	2.1E+5	1.1E+5
24h mean In/Out	0.30	0.28	0.25	0.29	0.26	0.28	0.28	0.02
Highest 8h Outdoor	3.0E+6	9.3E+5	3.2E+6	1.7E+6	4.1E+6	2.9E+6	2.6E+6	1.0E+6
Highest 8h Indoor	6.7E+5	2.3E+5	7.7E+5	4.5E+5	9.9E+5	8.1E+5	6.5E+5	2.5E+5
Highest 8 h In/Out	0.22	0.25	0.24	0.26	0.24	0.28	0.25	0.02
Highest 1h Outdoor	3.0E+6	1.4E+6	4.5E+6	2.5E+6	5.3E+6	6.2E+6	3.8E+6	1.7E+6
Highest 1 h Indoor ²	6.7E+5	2.3E+5	7.7E+5	4.5E+5	9.9E+5	8.1E+5	8.3E+5	3.7E+5
Highest 1h In/Out	0.23	0.19	0.23	0.21	0.23	0.20	0.21	0.01
Time of highest 1h Outdoor	12/2/14 16:17	12/4/14 6:29	12/4/14 22:06	12/5/14 20:52	12/6/14 22:02	12/7/14 20:02		
Corresponding highest 1h Indoor	12/2/14 17:35	12/4/14 7:17	12/4/14 23:30	12/5/14 21:45	12/6/14 23:33	12/7/14 20:42		

¹Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/2/2014 22:00, and has <24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-8-G-6. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.3–0.4 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Mean ¹	SD ¹
Outdoor 24h mean	2.1E+4	1.1E+4	1.7E+4	4.1E+4	4.1E+4	7.5E+4	3.4E+4	2.2E+4
Outdoor 24 SD	2.0E+4	9.7E+3	1.2E+4	2.8E+4	2.5E+4	2.5E+4	2.0E+4	6.9E+3
Indoor 24h mean	4.6E+3	1.6E+3	4.6E+3	3.8E+3	7.3E+3	1.4E+4	6.1E+3	4.1E+3
Indoor 24 SD	3.4E+3	5.6E+2	3.1E+3	1.6E+3	5.4E+3	5.3E+3	3.2E+3	1.8E+3
24h mean In/Out	0.23	0.22	0.19	0.20	0.12	0.18	0.19	0.03
Highest 8h Outdoor	4.3E+4	2.0E+4	2.9E+4	7.0E+4	7.0E+4	9.5E+4	5.5E+4	2.6E+4
Highest 8h Indoor	8.9E+3	2.3E+3	7.6E+3	4.9E+3	1.4E+4	1.9E+4	9.4E+3	5.6E+3
Highest 8 h In/Out	0.21	0.12	0.26	0.07	0.20	0.20	0.18	0.06
Highest 1h Outdoor	6.1E+4	4.2E+4	4.4E+4	9.6E+4	8.7E+4	1.0E+5	7.2E+4	2.4E+4
Highest 1h Indoor ²	8.9E+3	2.3E+3	7.6E+3	4.9E+3	1.4E+4	1.9E+4	1.1E+4	5.9E+3
Highest 1h In/Out	0.15	0.07	0.23	0.06	0.20	0.19	0.15	0.06
Time of highest 1h Outdoor	12/2/14 21:03	12/4/14 9:14	12/4/14 23:12	12/6/14 8:14	12/6/14 21:07	12/8/14 0:16		
Corresponding highest 1h Indoor	12/2/14 21:38	12/4/14 10:37	12/4/14 23:43	12/6/14 8:33	12/6/14 22:59	12/8/14 4:01		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/2/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-8-G-7. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.4–0.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Mean ¹	SD ¹
Outdoor 24h mean	3.0E+3	1.6E+3	2.7E+3	7.1E+3	5.4E+3	1.3E+4	5.4E+3	3.7E+3
Outdoor 24 SD	2.7E+3	1.4E+3	2.0E+3	5.0E+3	5.2E+3	5.0E+3	3.6E+3	1.6E+3
Indoor 24h mean	6.9E+2	2.6E+2	7.5E+2	5.3E+2	1.0E+3	2.0E+3	8.7E+2	5.5E+2
Indoor 24 SD	4.9E+2	6.7E+1	4.9E+2	2.2E+2	8.7E+2	7.5E+2	4.8E+2	2.8E+2
24h mean In/Out	0.23	0.24	0.20	0.19	0.11	0.17	0.19	0.04
Highest 8h Outdoor	6.3E+3	2.9E+3	4.9E+3	1.2E+4	1.2E+4	1.6E+4	9.1E+3	4.7E+3
Highest 8h Indoor	1.3E+3	3.4E+2	1.2E+3	6.7E+2	6.6E+2	2.5E+3	1.1E+3	7.0E+2
Highest 8 h In/Out	0.21	0.12	0.24	0.05	0.05	0.16	0.14	0.07
Highest 1h Outdoor	8.7E+3	5.9E+3	7.8E+3	1.7E+4	1.8E+4	2.0E+4	1.3E+4	5.6E+3
Highest 1 h Indoor ²	1.3E+3	3.4E+2	1.2E+3	6.7E+2	6.6E+2	2.5E+3	1.6E+3	9.1E+2
Highest 1h In/Out	0.16	0.07	0.20	0.05	0.16	0.14	0.13	0.05
Time of highest 1h Outdoor	12/2/14 20:47	12/4/14 9:26	12/4/14 23:15	12/6/14 8:01	12/6/14 21:08	12/8/14 0:30		
Corresponding highest 1h Indoor	12/2/14 21:37	12/4/14 9:56	12/4/14 23:43	12/6/14 8:15	12/6/14 22:15	12/8/14 0:45		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/2/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-8-G-8. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.5–0.7 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Mean ¹	SD ¹
Outdoor 24h mean	1.6E+3	9.2E+2	1.8E+3	3.2E+3	2.6E+3	4.4E+3	2.4E+3	1.1E+3
Outdoor 24 SD	1.2E+3	4.3E+2	1.2E+3	1.9E+3	3.2E+3	2.0E+3	1.7E+3	8.6E+2
Indoor 24h mean	3.9E+2	1.9E+2	4.8E+2	3.2E+2	5.4E+2	8.5E+2	4.6E+2	2.1E+2
Indoor 24 SD	2.3E+2	3.2E+1	3.1E+2	1.0E+2	5.1E+2	3.0E+2	2.5E+2	1.5E+2
24h mean In/Out	0.23	0.25	0.22	0.21	0.14	0.21	0.21	0.04
Highest 8h Outdoor	3.3E+3	1.3E+3	3.1E+3	5.2E+3	5.9E+3	5.1E+3	4.0E+3	1.6E+3
Highest 8h Indoor	7.1E+2	2.2E+2	7.5E+2	3.5E+2	1.2E+3	1.1E+3	7.1E+2	3.4E+2
Highest 8 h In/Out	0.22	0.17	0.24	0.07	0.20	0.21	0.18	0.06
Highest 1h Outdoor	4.3E+3	2.1E+3	4.7E+3	7.0E+3	1.2E+4	8.7E+3	6.4E+3	3.1E+3
Highest 1 h Indoor ²	7.1E+2	2.2E+2	7.5E+2	3.5E+2	1.2E+3	1.1E+3	9.2E+2	5.3E+2
Highest 1h In/Out	0.17	0.12	0.20	0.06	0.15	0.16	0.14	0.04
Time of highest 1h Outdoor	12/2/14 20:33	12/4/14 9:29	12/4/14 23:16	12/6/14 7:57	12/6/14 21:08	12/7/14 20:17		
Corresponding highest 1h Indoor	12/2/14 21:34	12/4/14 9:57	12/4/14 23:44	12/6/14 7:57	12/6/14 21:48	12/7/14 20:56		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/2/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-8-G-9. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.7–1.0 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Mean ¹	SD ¹
Outdoor 24h mean	3.4E+2	2.8E+2	5.0E+2	5.7E+2	4.8E+2	5.4E+2	4.5E+2	1.1E+2
Outdoor 24 SD	1.6E+2	1.1E+2	2.1E+2	1.6E+2	6.5E+2	3.8E+2	2.8E+2	1.9E+2
Indoor 24h mean	8.2E+1	6.0E+1	1.1E+2	8.3E+1	9.5E+1	1.2E+2	9.2E+1	2.0E+1
Indoor 24 SD	3.2E+1	1.1E+1	7.5E+1	2.1E+1	9.1E+1	4.6E+1	4.6E+1	2.9E+1
24h mean In/Out	0.24	0.24	0.21	0.20	0.16	0.22	0.21	0.02
Highest 8h Outdoor	6.3E+2	3.3E+2	7.5E+2	6.7E+2	1.1E+3	7.3E+2	7.0E+2	2.3E+2
Highest 8h Indoor	1.5E+2	6.5E+1	1.7E+2	1.0E+2	2.0E+2	1.5E+2	1.4E+2	4.5E+1
Highest 8 h In/Out	0.23	0.20	0.23	0.16	0.19	0.20	0.20	0.03
Highest 1h Outdoor	6.6E+2	4.8E+2	9.3E+2	8.2E+2	2.5E+3	1.5E+3	1.1E+3	6.7E+2
Highest 1 h Indoor ²	1.5E+2	6.5E+1	1.7E+2	1.0E+2	2.0E+2	1.5E+2	1.8E+2	8.7E+1
Highest 1h In/Out	0.18	0.15	0.20	0.15	0.13	0.17	0.16	0.02
Time of highest 1h Outdoor	12/2/14 20:28	12/4/14 9:30	12/4/14 23:14	12/5/14 20:31	12/6/14 21:08	12/7/14 18:57		
Corresponding highest 1h Indoor	12/2/14 21:03	12/4/14 10:20	12/4/14 23:35	12/5/14 21:20	12/6/14 21:48	12/7/14 20:48		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/2/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-8-G-10. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 1.0–2.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Mean ¹	SD ¹
Outdoor 24h mean	2.3E+2	2.1E+2	3.6E+2	4.2E+2	2.6E+2	2.7E+2	2.9E+2	7.3E+1
Outdoor 24 SD	5.7E+1	1.5E+2	1.1E+2	1.1E+2	2.9E+2	1.8E+2	1.5E+2	7.3E+1
Indoor 24h mean	4.6E+1	3.5E+1	5.9E+1	5.0E+1	4.0E+1	4.5E+1	4.6E+1	7.7E+0
Indoor 24 SD	1.3E+1	7.6E+0	5.1E+1	1.4E+1	3.5E+1	2.0E+1	2.3E+1	1.5E+1
24h mean In/Out	0.21	0.19	0.15	0.14	0.13	0.17	0.17	0.03
Highest 8h Outdoor	3.6E+2	3.2E+2	4.4E+2	5.2E+2	5.5E+2	3.9E+2	4.3E+2	8.3E+1
Highest 8h Indoor	7.7E+1	3.9E+1	7.9E+1	6.5E+1	8.2E+1	5.8E+1	6.7E+1	1.5E+1
Highest 8 h In/Out	0.22	0.12	0.18	0.13	0.15	0.15	0.16	0.03
Highest 1h Outdoor	3.6E+2	5.6E+2	5.2E+2	6.4E+2	1.1E+3	7.1E+2	6.5E+2	2.3E+2
Highest 1 h Indoor ²	7.7E+1	3.9E+1	7.9E+1	6.5E+1	8.2E+1	5.8E+1	7.9E+1	3.1E+1
Highest 1h In/Out	0.21	0.08	0.08	0.12	0.11	0.15	0.13	0.04
Time of highest 1h Outdoor	12/2/14 17:29	12/4/14 12:07	12/5/14 13:00	12/5/14 19:49	12/6/14 21:08	12/7/14 18:57		
Corresponding highest 1h Indoor	12/2/14 17:29	12/4/14 12:40	12/5/14 13:42	12/5/14 20:45	12/6/14 21:48	12/7/14 20:41		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/2/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-8-G-11. Summary statistics for estimated PM_{2.5} concentrations ($\mu\text{g m}^{-3}$) calculated from particle number concentrations resolved by size from 6 nm to 2.5 microns (as reported in Tables FW-7-D-2 to FW-7-D-9) and resulting indoor/outdoor ratios.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Mean ¹	SD ¹
Outdoor 24h mean	9.1E+0	6.6E+0	1.3E+1	1.2E+1	1.4E+1	1.9E+1	1.2E+1	3.8E+0
Outdoor 24 SD	5.5E+0	1.9E+0	6.2E+0	3.9E+0	1.1E+1	7.2E+0	6.0E+0	2.9E+0
Indoor 24h mean	2.4E+0	1.3E+0	3.1E+0	2.2E+0	3.1E+0	4.4E+0	2.7E+0	9.5E-1
Indoor 24 SD	1.3E+0	2.0E-1	1.8E+0	5.7E-1	2.1E+0	1.4E+0	1.2E+0	6.6E-1
24h mean In/Out	0.26	0.24	0.21	0.23	0.20	0.24	0.23	0.02
Highest 8h Outdoor	1.8E+1	8.6E+0	2.0E+1	1.4E+1	2.7E+1	2.2E+1	1.8E+1	5.7E+0
Highest 8h Indoor	4.1E+0	1.5E+0	4.4E+0	2.4E+0	5.9E+0	5.0E+0	3.9E+0	1.5E+0
Highest 8 h In/Out	0.23	0.18	0.22	0.17	0.22	0.23	0.21	0.03
Highest 1h Outdoor	1.9E+1	1.1E+1	2.6E+1	1.8E+1	3.8E+1	3.9E+1	2.5E+1	1.0E+1
Highest 1 h Indoor ²	4.1E+0	1.5E+0	4.4E+0	2.4E+0	5.9E+0	5.0E+0	4.9E+0	2.2E+0
Highest 1h In/Out	0.21	0.14	0.22	0.17	0.19	0.19	0.19	0.03
Time of highest 1h Outdoor	12/2/14 20:57	12/4/14 9:37	12/4/14 22:06	12/5/14 20:32	12/6/14 21:08	12/7/14 20:02		
Corresponding highest 1h Indoor	12/2/14 21:46	12/4/14 9:49	12/4/14 23:33	12/5/14 21:43	12/6/14 22:37	12/7/14 20:45		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/2/2014 22:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-8-G-12. Summary statistics for concentrations of PM_{2.5} ($\mu\text{g m}^{-3}$) and indoor /outdoor ratios from measurements reported by TSI DustTrak II.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Mean ¹	SD ¹
Outdoor 24h mean	1.3E-2	4.4E-3	1.1E-2	2.3E-2	2.5E-2	3.9E-2	1.9E-2	1.1E-2
Outdoor 24 SD	1.3E-2	3.4E-3	8.1E-3	1.4E-2	2.1E-2	1.3E-2	1.2E-2	5.4E-3
Indoor 24h mean	2.5E-3	1.0E-3	2.4E-3	1.8E-3	4.0E-3	6.2E-3	3.0E-3	1.7E-3
Indoor 24 SD	1.6E-3	8.7E-5	1.8E-3	7.0E-4	3.6E-3	2.7E-3	1.8E-3	1.2E-3
24h mean In/Out	0.18	0.30	0.22	0.15	0.11	0.15	0.19	0.06
Highest 8h Outdoor	2.8E-2	7.4E-3	2.0E-2	3.6E-2	5.0E-2	4.8E-2	3.2E-2	1.5E-2
Highest 8h Indoor	4.4E-3	1.2E-3	4.6E-3	2.0E-3	8.6E-3	8.5E-3	4.9E-3	2.8E-3
Highest 8 h In/Out	0.16	0.17	0.23	0.05	0.17	0.18	0.16	0.05
Highest 1h Outdoor	4.0E-2	1.5E-2	3.0E-2	5.2E-2	6.7E-2	6.1E-2	4.4E-2	1.8E-2
Highest 1 h Indoor ²	4.4E-3	1.2E-3	4.6E-3	2.0E-3	8.6E-3	8.5E-3	5.8E-3	3.5E-3
Highest 1h In/Out	0.11	0.07	0.22	0.05	0.17	0.14	0.13	0.06
Time of highest 1h Outdoor	12/2/14 20:58	12/4/14 9:17	12/4/14 22:57	12/6/14 8:00	12/6/14 21:08	12/7/14 20:00		
Corresponding highest 1h Indoor	12/2/14 21:37	12/4/14 9:17	12/4/14 23:33	12/6/14 8:26	12/6/14 22:34	12/7/14 20:48		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/2/2014 22:00, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-8-G-13. Daily¹ summary statistics for concentrations (nanograms m^{-3}) and indoor /outdoor ratios of aerosol black carbon measured using the Aethalometer AE22.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Day 5	Day 6	Mean ¹	SD ¹
Outdoor 24h mean	3.1E+2	2.7E+2	8.7E+2	4.3E+2	7.9E+2	1.2E+3	6.4E+2	3.3E+2
Outdoor 24 SD	1.6E+2	1.2E+2	8.2E+2	1.8E+2	6.8E+2	5.7E+2	4.2E+2	2.8E+2
Indoor 24h mean	1.0E+2	7.4E+1	3.3E+2	1.1E+2	2.9E+2	3.9E+2	2.2E+2	1.3E+2
Indoor 24 SD	7.1E+1	3.6E+1	2.7E+2	3.9E+1	2.3E+2	1.8E+2	1.4E+2	9.3E+1
24h mean In/Out	0.38	0.28	0.32	0.35	0.29	0.36	0.33	0.03
Highest 8h Outdoor	6.8E+2	3.9E+2	1.7E+3	5.7E+2	1.6E+3	1.6E+3	1.1E+3	5.5E+2
Highest 8h Indoor	2.4E+2	1.2E+2	6.3E+2	1.2E+2	5.7E+2	5.2E+2	3.7E+2	2.1E+2
Highest 8 h In/Out	0.36	0.30	0.37	0.22	0.36	0.33	0.32	0.05
Highest 1h Outdoor	7.1E+2	5.7E+2	3.2E+3	7.5E+2	2.4E+3	2.1E+3	1.6E+3	1.0E+3
Highest 1 h Indoor ²	2.4E+2	1.2E+2	6.3E+2	1.2E+2	5.7E+2	5.2E+2	4.9E+2	3.2E+2
Highest 1h In/Out	0.35	0.27	0.30	0.18	0.33	0.30	0.29	0.05
Time of highest 1h Outdoor	12/2/14 17:15	12/4/14 9:09	12/4/14 22:06	12/6/14 10:06	12/6/14 22:09	12/8/14 5:39		
Corresponding highest 1h Indoor	12/2/14 18:03	12/4/14 9:48	12/4/14 22:06	12/6/14 10:06	12/7/14 0:30	12/8/14 6:45		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/2/2014 22:00, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

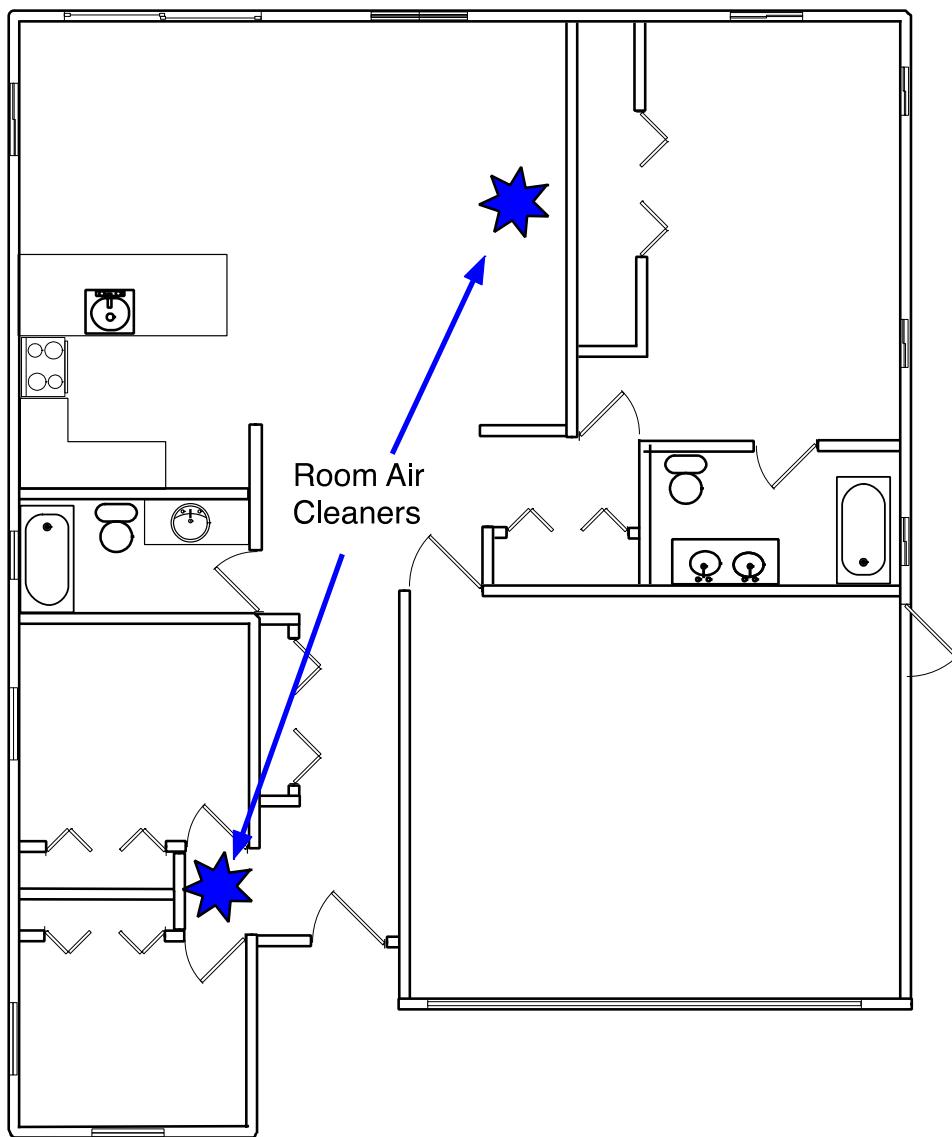
Appendix FW-9-PA. Results for Portable Air Cleaners, Auto, December 8-12, 2014.

Table FW-9-PA-1. Description of **Portable Air Cleaners in Automatic Mode** component characteristics during the period of **December 8-12, 2014**

System Parameter	Description or Measured Value
Heating	75,000 BTU/h, 80% eff., gas furnace, 1-stage burner
Cooling	3 ton, SEER13 air conditioner
Thermal distribution	Central fan with PSC motor: 1200 cfm for cooling, 1074 cfm for heating
Ventilation	Exhaust fan in main bathroom with ECM; Set to 38 cfm continuous
Filtration	MERV4, 1" (Purolator F312) filter installed at return air ceiling grill of forced air furnace. Some particle removal as air infiltrates through building envelope to replace air exiting home through continuous exhaust fan in bathroom. Two portable room air cleaners (RabbitAir MinusA2 SPA-780A) set to AUTO mode.
Recirculation blower schedule	As required for thermal conditioning, no fan cycler.
VOC removal system	None

Notes about this monitoring period

There were no major instrument problems for this operational period.

The 24 h running statistics in the figures starts at 12/8/2014 19:00.

There was heavy rain throughout the day of 12/11/2014. There was fog on the days of 12/9/2014, and 12/10/2014.

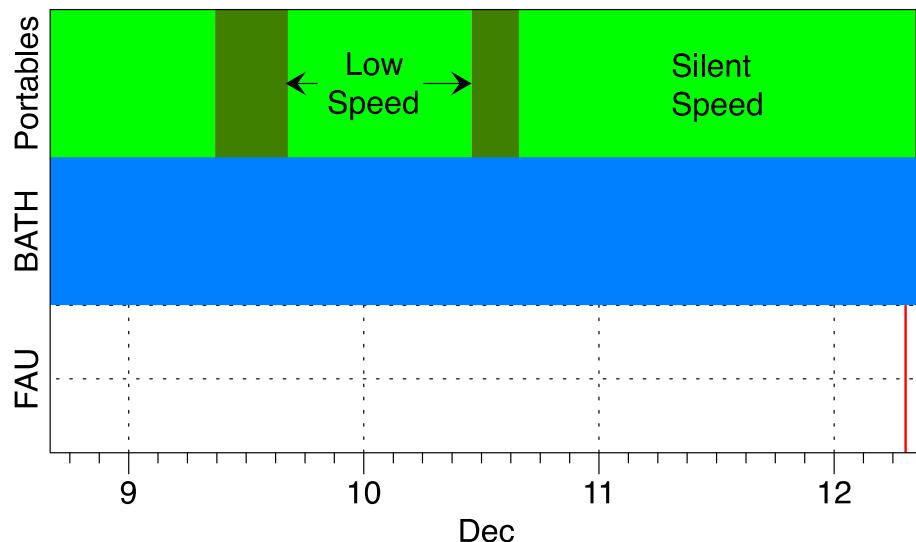


Figure FW-9-PA-1. Operation of mechanical systems: Portable air cleaners; Bath exhaust fan; fan on central forced air unit (FAU).

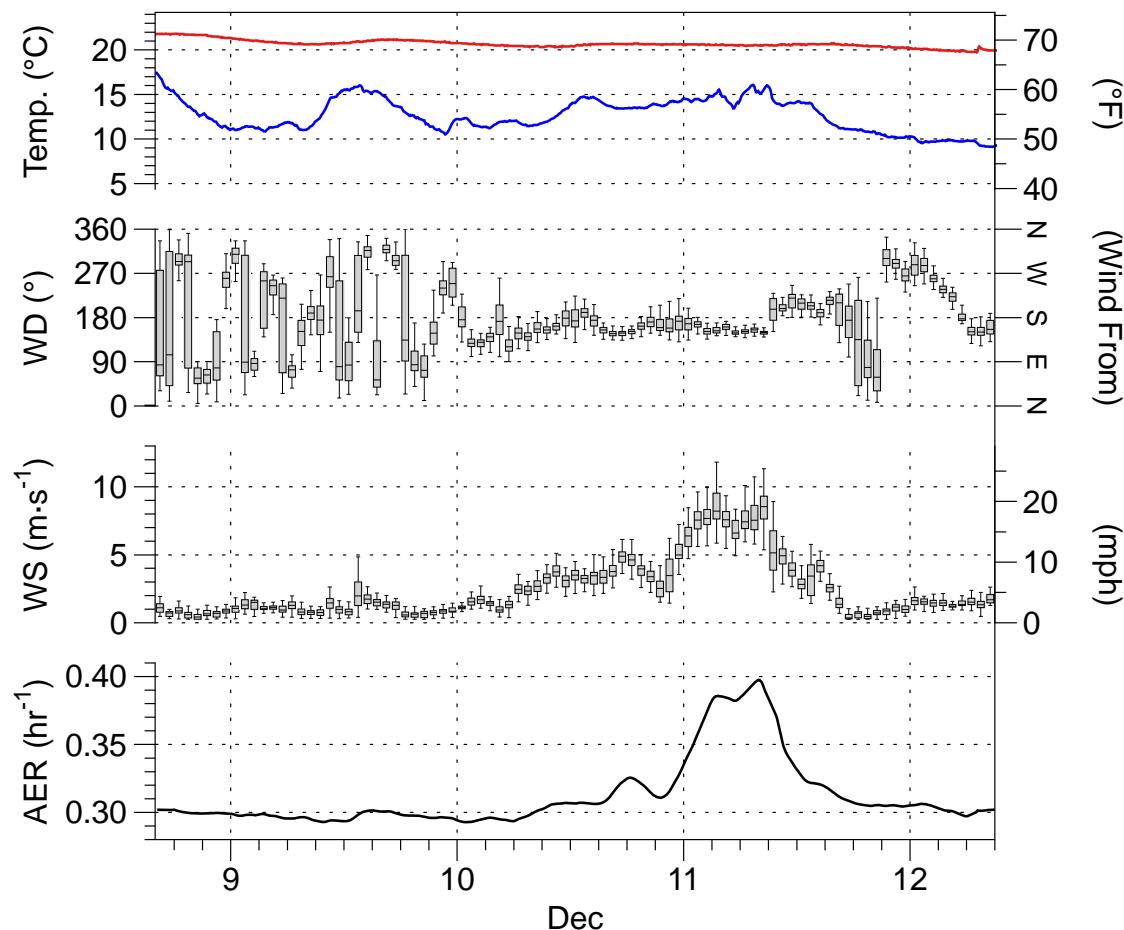


Figure FW-9-PA-2. Environmental parameters measured during operation of Portable Air Cleaners, Auto, Dec 8-12, 2014. From top to bottom: indoor (red) and outdoor (blue) temperatures, wind direction (WD) in units of degrees from North, wind speed (WS), and air exchange rate (AER). For WD and WS, the box for each hour shows the 25th, 50th and 75th percentiles of the measured values and whiskers extend 1.5X the interquartile range (75th-25th percentile values) above the 75th and below the 25th percentile values.

Guide to plots of pollutant concentration time series and indoor / outdoor (I/O) ratios

The bottom section of each plot shows outdoor and indoor time series using the resolution of data collection: 3-min for black carbon and 1-min for all other parameters. The top and bottom of grey band are LOESS-smoothed, 1-min (or 3-min for black carbon) time-series. Also shown are time series with 1h and 24h time averaging for most pollutants. Triangles in bottom of plot indicate the highest 1h outdoor and corresponding highest 1h indoor average during each day. The top section of each plot shows the ratio of indoor to outdoor running 24h mean values (8h for ozone) and the ratios of highest 1h indoor to corresponding highest 1h outdoor concentration each day.

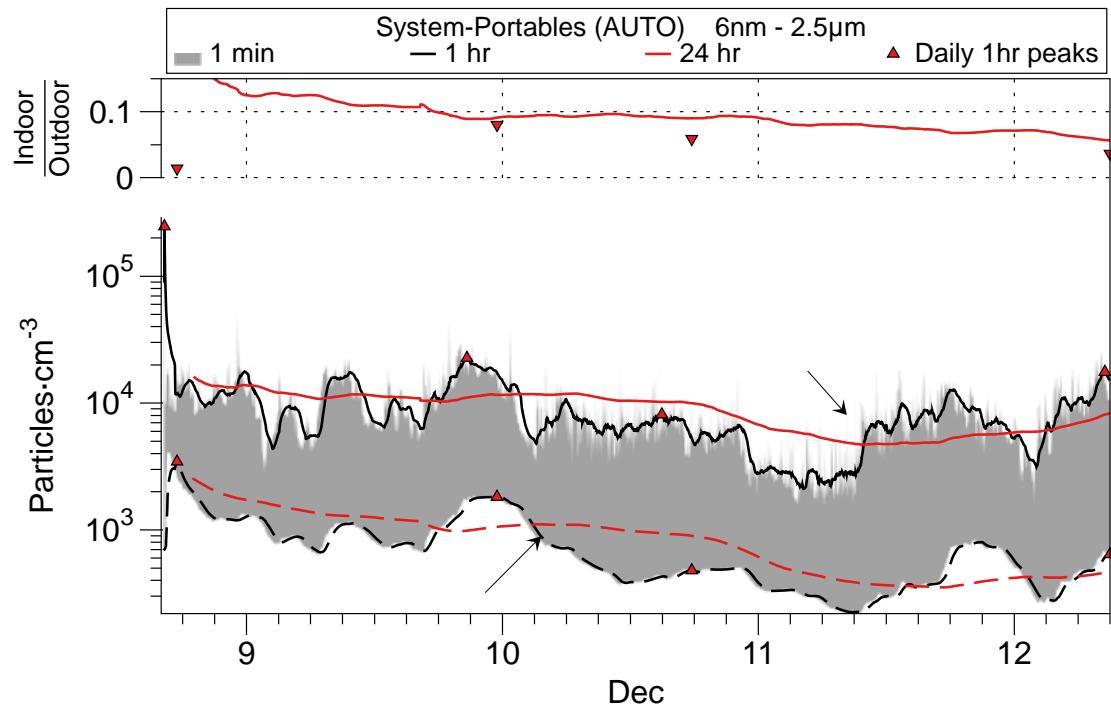


Figure FW-9-PA-3. Number concentrations of 6 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of Portable Air Cleaners, Auto, Dec 8-12, 2014. Data collected using TSI 3787 CPCs.

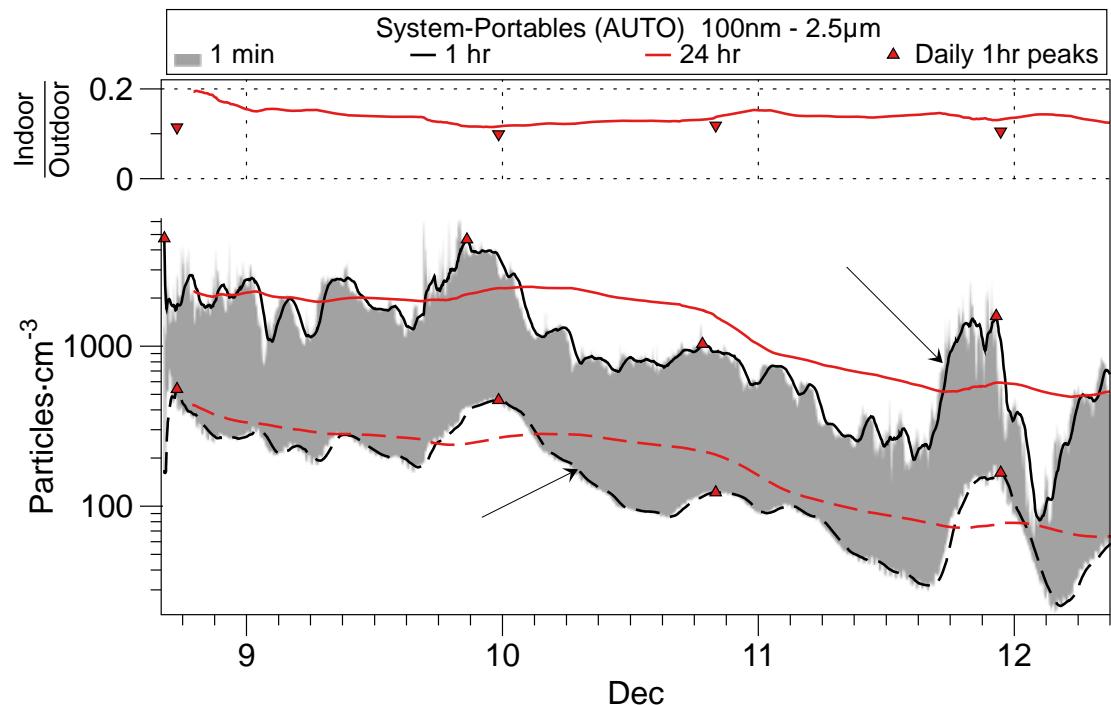


Figure FW-9-PA-4. Number concentrations of 100 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of Portable Air Cleaners, Auto, Dec 8-12, 2014. Data collected using TSI 3781 CPCs outfitted with screens to exclude particles smaller than 100 nm. Refer to “Guide” before Figure FW-9-PA-3.

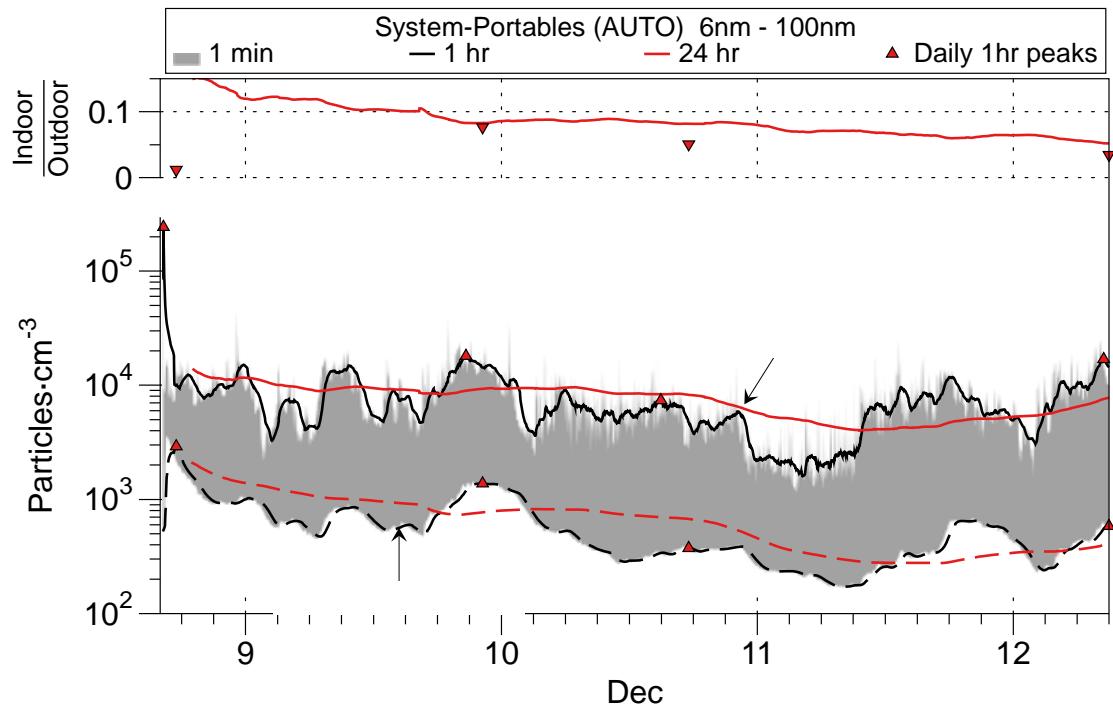


Figure FW-9-PA-5. Number concentrations of 6–100 nm diameter particles measured outdoors and indoors during operation of Portable Air Cleaners, Auto, Dec 8–12, 2014. Data obtained as the difference between time series show in prior two figures. Refer to “Guide” before Figure FW-9-PA-3.

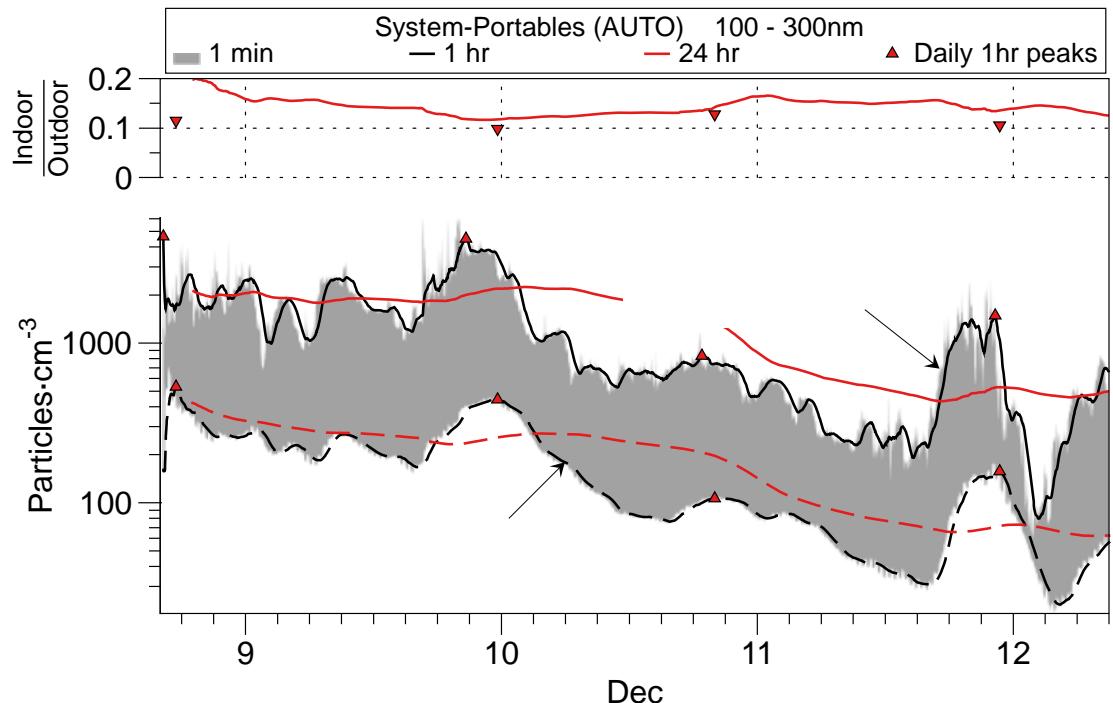


Figure FW-9-PA-6. Number concentrations of 100–300 nm diameter particles measured outdoors and indoors during operation of Portable Air Cleaners, Auto, Dec 8–12, 2014. Data obtained as the difference between the TSI 3781 CPC with size selector and the MetOne BT637S OPC. Refer to “Guide” before Figure FW-9-PA-3

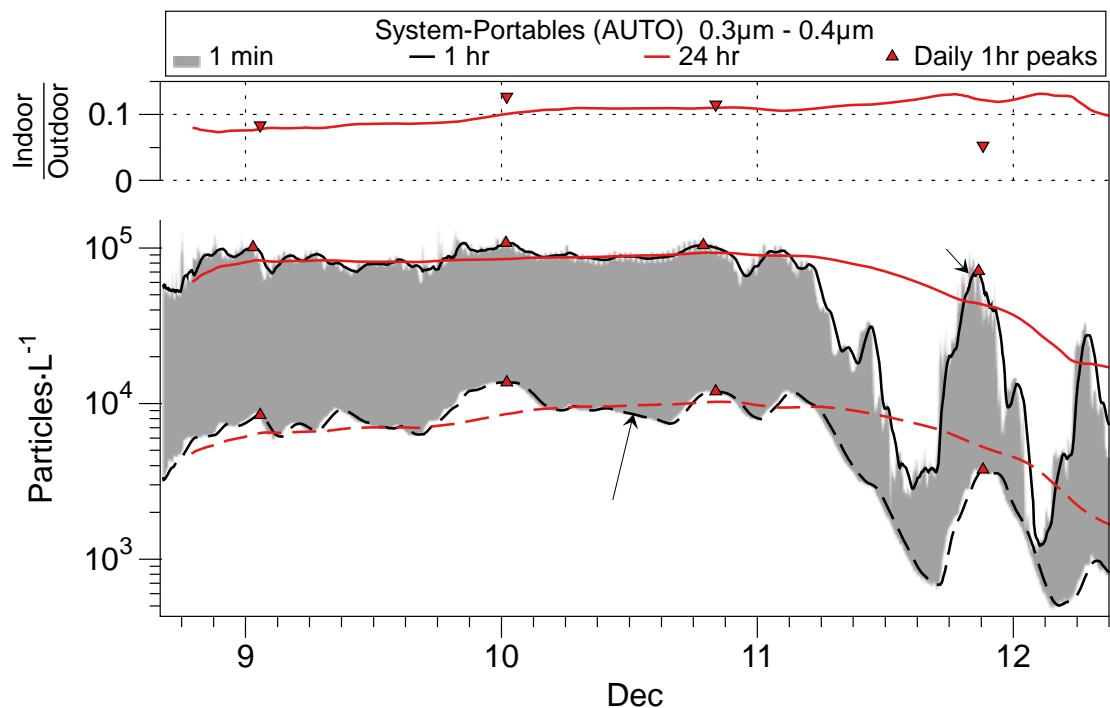


Figure FW-9-PA-7. Number concentrations of 0.3–0.4 μm diameter particles measured outdoors and indoors during operation of Portable Air Cleaners, Auto, Dec 8-12, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-9-PA-3.

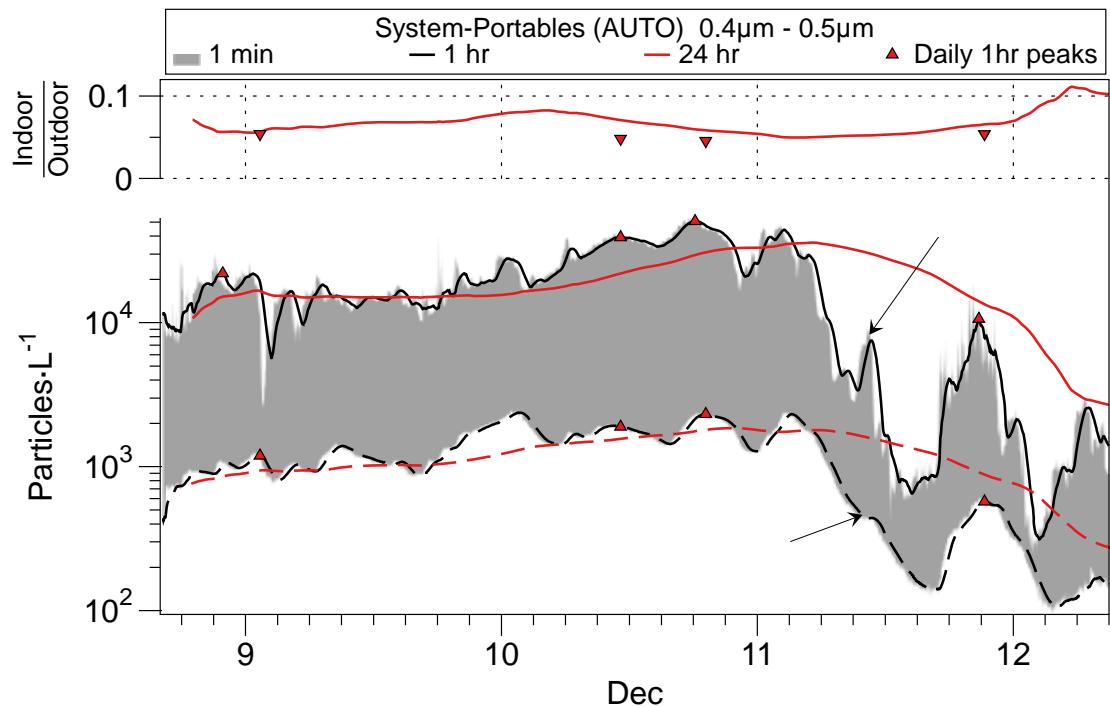


Figure FW-9-PA-8. Number concentrations of 0.4–0.5 μm diameter particles measured outdoors and indoors during operation of Portable Air Cleaners, Auto, Dec 8-12, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-9-PA-3.

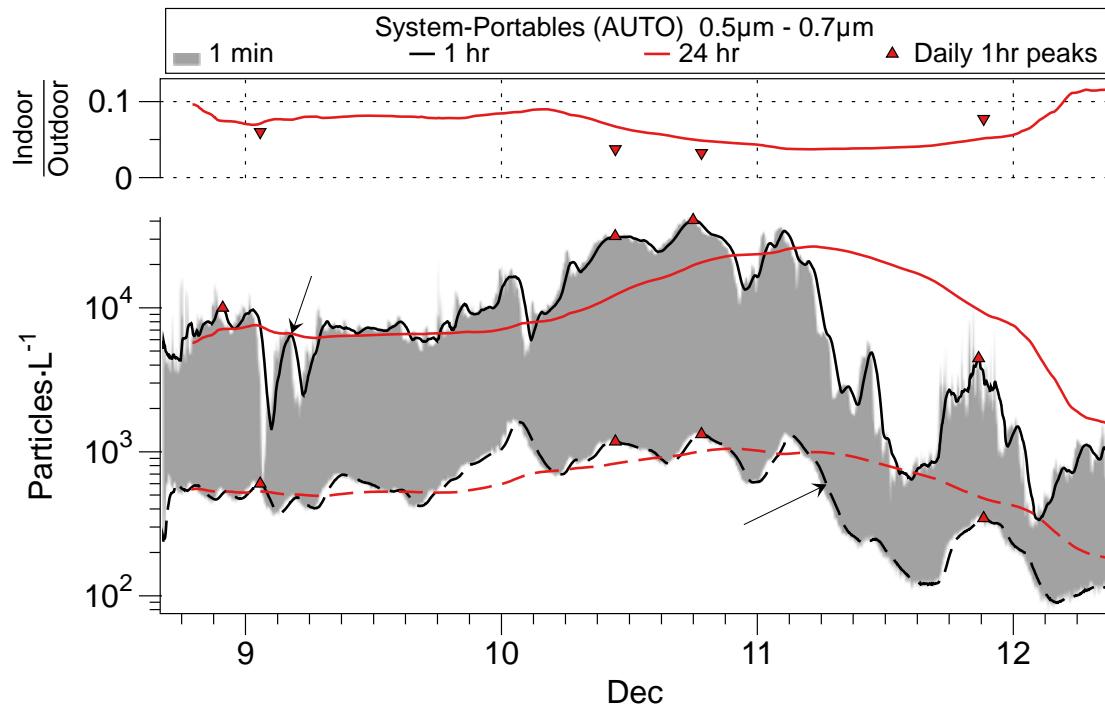


Figure FW-9-PA-9. Number concentrations of 0.5–0.7 μm diameter particles measured outdoors and indoors during operation of Portable Air Cleaners, Auto, Dec 8-12, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-9-PA-3.

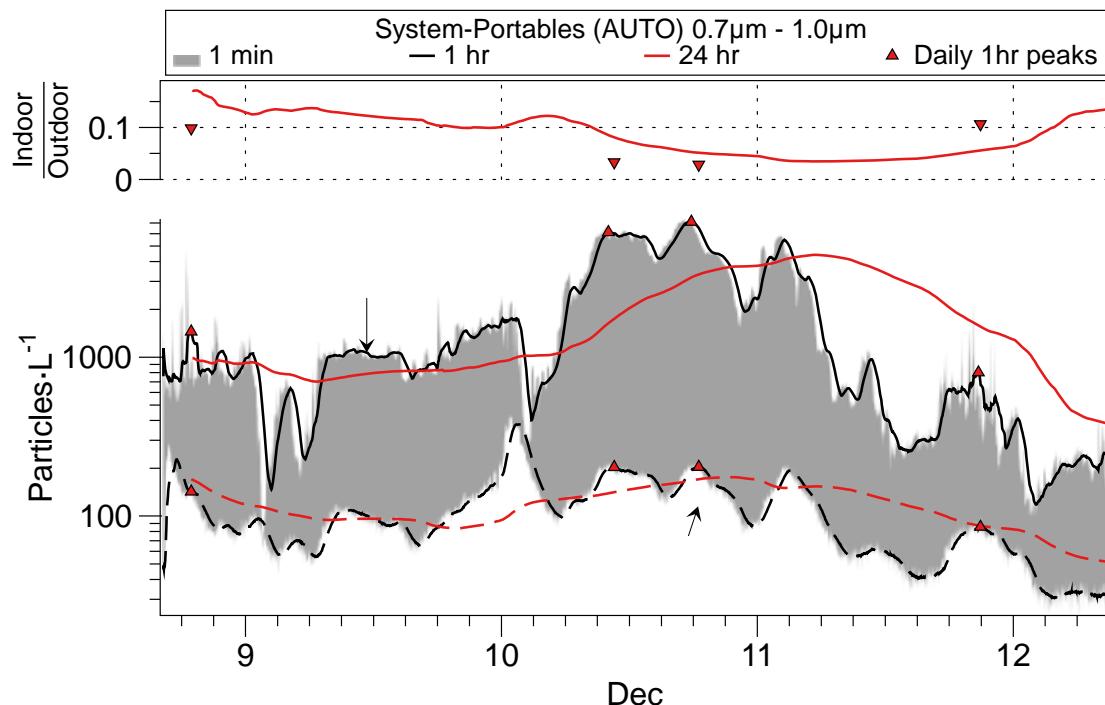


Figure FW-9-PA-10. Number concentrations of 0.7–1.0 μm diameter particles measured outdoors and indoors during operation of Portable Air Cleaners, Auto, Dec 8-12, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-9-PA-3.

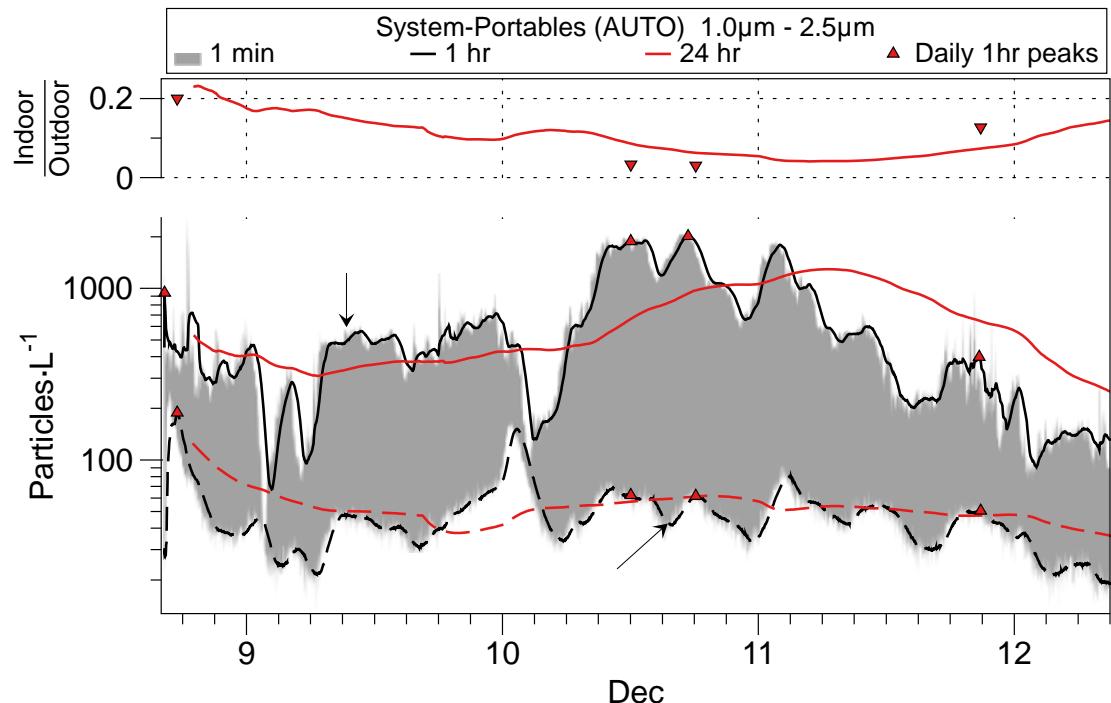


Figure FW-9-PA-11. Number concentrations of 1.0–2.5 μm diameter particles measured outdoors and indoors during operation of Portable Air Cleaners, Auto, Dec 8-12, 2014. Data collected using MetOne BT637S particle counters. Refer to Figure FW-9-PA-3 for details.

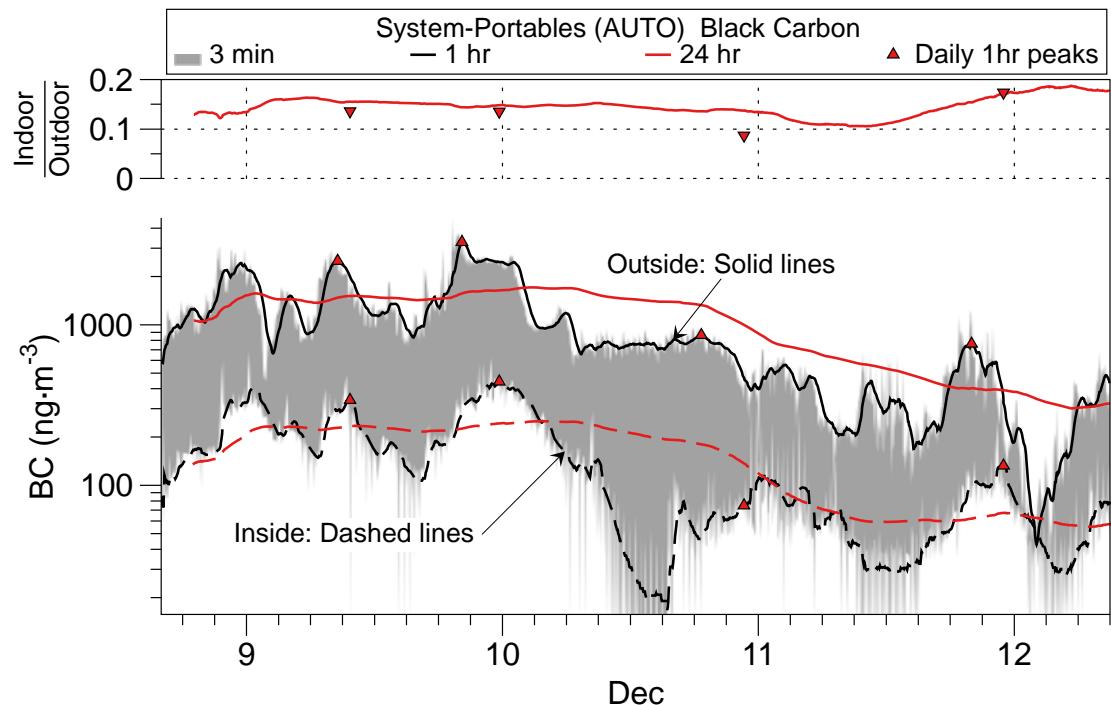


Figure FW-9-PA-12. Black carbon concentrations measured outdoors and indoors during operation of Portable Air Cleaners, Auto, Dec 8-12, 2014. Data collected using AE22 Aethalometers with 3-min samples. Data otherwise as described in Figure FW-9-PA-3 caption.

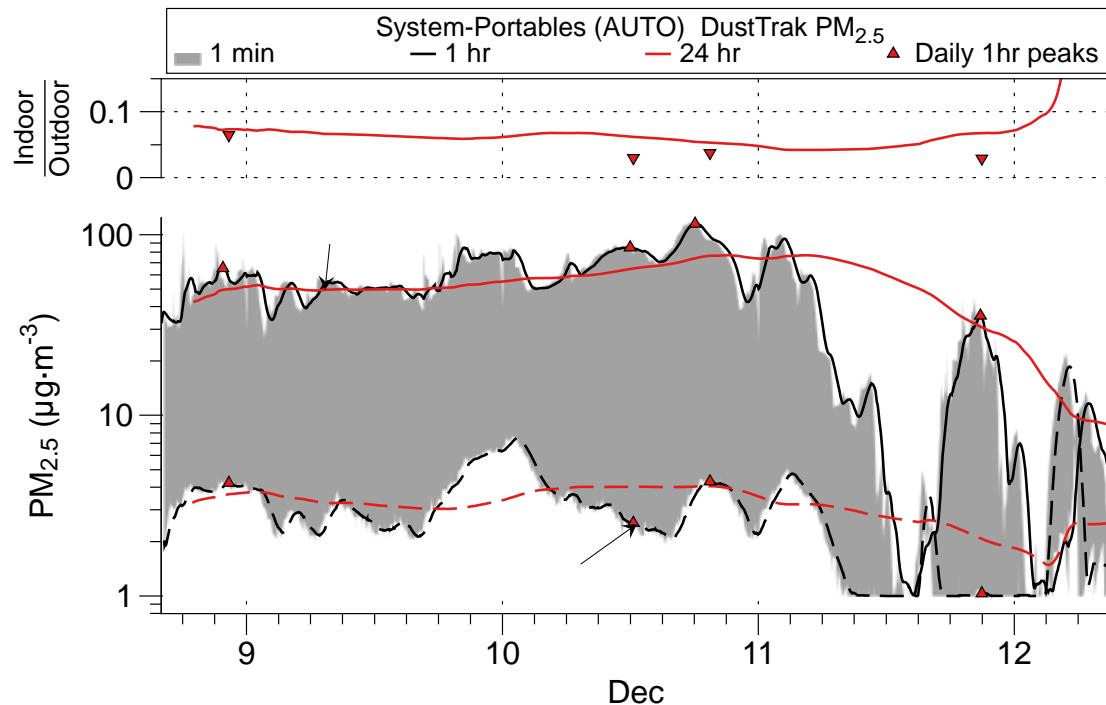


Figure FW-9-PA-13. PM_{2.5} reported by TSI DustTrak II 8530 measurements outdoors and indoors during operation of Portable Air Cleaners, Auto, Dec 8-12, 2014. The DustTrak measures light scattering and uses a calibration to estimate PM_{2.5} mass. Refer to “Guide” before Figure FW-9-PA-3.

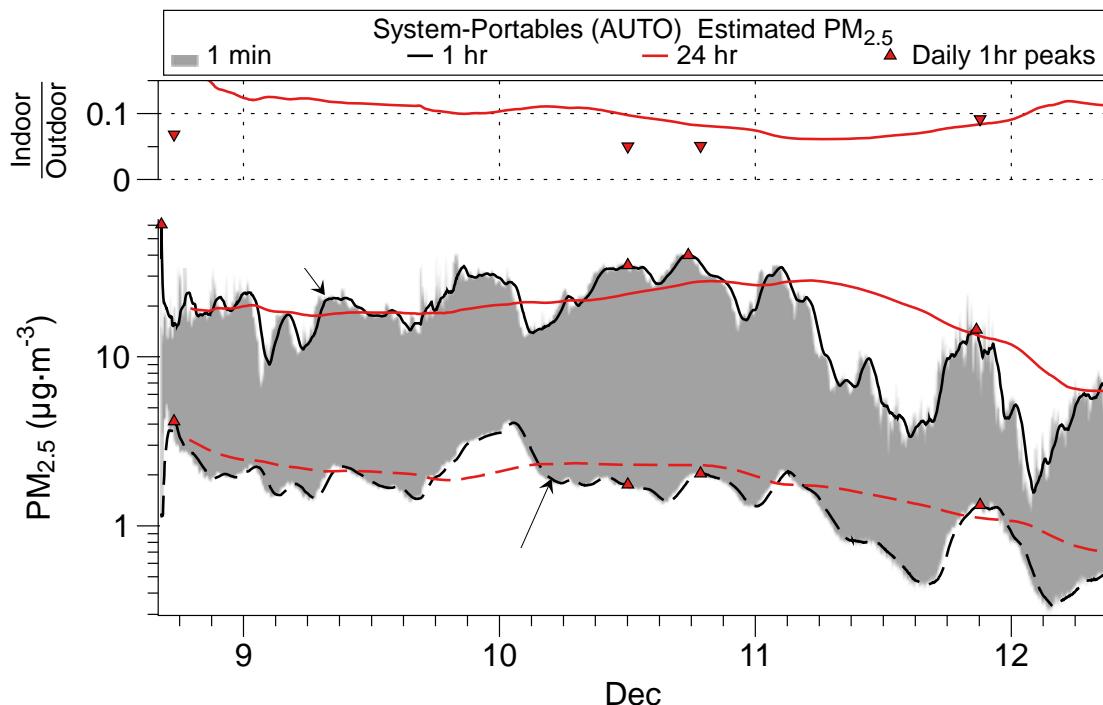


Figure FW-9-PA-14. Estimated PM_{2.5} concentration calculated from size-resolved particle number concentrations measured by MetOne and CPC during operation of Portable Air Cleaners, Auto, Dec 8-12, 2014. Details provided in body of report. Refer to “Guide” before Figure FW-9-PA-3.

Table FW-9-PA-2. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6 nm to 2.5 micron measured using the TSI 3787 CPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	1.1E+4	1.0E+4	4.8E+3	8.7E+3	8.8E+3	2.5E+3
Outdoor 24 SD	1.2E+4	5.6E+3	2.5E+3	3.8E+3	6.0E+3	3.8E+3
Indoor 24h mean	1.2E+3	9.7E+2	3.6E+2	5.1E+2	7.7E+2	3.5E+2
Indoor 24 SD	6.3E+2	4.8E+2	9.2E+1	1.7E+2	3.4E+2	2.2E+2
24h mean In/Out	0.13	0.10	0.09	0.07	0.09	0.02
Highest 8h Outdoor	2.5E+5	1.6E+4	7.0E+3	9.7E+3	7.0E+4	1.0E+5
Highest 8h Indoor	3.1E+3	1.6E+3	5.1E+2	4.2E+2	1.4E+3	1.1E+3
Highest 8 h In/Out	0.01	0.10	0.07	0.04	0.06	0.03
Highest 1h Outdoor	2.5E+5	2.3E+4	8.1E+3	1.8E+4	7.4E+4	1.0E+5
Highest 1 h Indoor ²	3.1E+3	1.6E+3	5.1E+2	4.2E+2	1.6E+3	1.2E+3
Highest 1h In/Out	0.01	0.08	0.06	0.04	0.05	0.02
Time of highest 1h Outdoor	12/8/14 16:18	12/9/14 20:40	12/10/14 14:57	12/12/14 8:30		
Corresponding highest 1h Indoor	12/8/14 17:29	12/9/14 23:29	12/10/14 17:45	12/12/14 8:59		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/8/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-9-PA-3. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100 nm to 2.5 micron measured using the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	2.0E+3	1.9E+3	6.1E+2	5.7E+2	1.3E+3	6.8E+2
Outdoor 24 SD	5.8E+2	1.2E+3	2.6E+2	4.7E+2	6.3E+2	3.6E+2
Indoor 24h mean	2.7E+2	2.5E+2	8.6E+1	6.9E+1	1.7E+2	9.3E+1
Indoor 24 SD	8.0E+1	1.2E+2	2.6E+1	4.6E+1	6.7E+1	3.5E+1
24h mean In/Out	0.16	0.12	0.14	0.14	0.14	0.01
Highest 8h Outdoor	4.7E+3	3.4E+3	8.9E+2	9.5E+2	2.5E+3	1.6E+3
Highest 8h Indoor	4.9E+2	4.0E+2	1.1E+2	1.2E+2	2.8E+2	1.7E+2
Highest 8 h In/Out	0.10	0.12	0.12	0.12	0.12	0.01
Highest 1h Outdoor	4.7E+3	4.6E+3	1.0E+3	1.5E+3	3.0E+3	1.7E+3
Highest 1 h Indoor ²	4.9E+2	4.0E+2	1.1E+2	1.2E+2	3.2E+2	1.8E+2
Highest 1h In/Out	0.11	0.10	0.12	0.11	0.11	0.01
Time of highest 1h Outdoor	12/8/14 16:17	12/9/14 20:40	12/10/14 18:46	12/11/14 22:19		
Corresponding highest 1h Indoor	12/8/14 17:28	12/9/14 23:38	12/10/14 20:00	12/11/14 22:44		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/8/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-9-PA-4. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6–100 nm based on difference between concentrations measured using the TSI 3787 CPC and the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	9.2E+3	8.5E+3	4.2E+3	8.1E+3	7.5E+3	2.0E+3
Outdoor 24 SD	1.2E+4	4.5E+3	2.4E+3	3.7E+3	5.7E+3	3.8E+3
Indoor 24h mean	9.5E+2	7.2E+2	2.8E+2	4.4E+2	6.0E+2	2.6E+2
Indoor 24 SD	5.5E+2	3.6E+2	7.2E+1	1.3E+2	2.8E+2	1.9E+2
24h mean In/Out	0.12	0.09	0.08	0.06	0.09	0.02
Highest 8h Outdoor	2.4E+5	1.3E+4	6.2E+3	9.4E+3	6.8E+4	1.0E+5
Highest 8h Indoor	2.6E+3	1.2E+3	3.8E+2	3.8E+2	1.1E+3	9.0E+2
Highest 8 h In/Out	0.01	0.09	0.06	0.04	0.05	0.03
Highest 1h Outdoor	2.4E+5	1.8E+4	7.4E+3	1.7E+4	7.1E+4	9.9E+4
Highest 1 h Indoor ²	2.6E+3	1.2E+3	3.8E+2	3.8E+2	1.3E+3	1.0E+3
Highest 1h In/Out	0.01	0.08	0.05	0.03	0.04	0.02
Time of highest 1h Outdoor	12/8/14 16:18	12/9/14 20:40	12/10/14 14:57	12/12/14 8:29		
Corresponding highest 1h Indoor	12/8/14 17:30	12/9/14 22:14	12/10/14 17:34	12/12/14 8:59		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/8/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-9-PA-5. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100–300 nm based on difference between concentrations measured using the TSI 3781 CPC with size selector and the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	1.9E+6	1.8E+6	5.0E+5	5.5E+5	1.2E+6	6.6E+5
Outdoor 24 SD	5.7E+5	1.2E+6	2.0E+5	4.5E+5	6.1E+5	3.8E+5
Indoor 24h mean	2.7E+5	2.4E+5	7.5E+4	6.7E+4	1.6E+5	9.0E+4
Indoor 24 SD	8.1E+4	1.2E+5	2.2E+4	4.4E+4	6.6E+4	3.6E+4
24h mean In/Out	0.17	0.13	0.15	0.14	0.15	0.01
Highest 8h Outdoor	4.6E+6	3.3E+6	7.2E+5	9.1E+5	2.4E+6	1.6E+6
Highest 8h Indoor	4.8E+5	3.8E+5	1.2E+5	1.1E+5	2.7E+5	1.6E+5
Highest 8 h In/Out	0.10	0.12	0.17	0.12	0.13	0.02
Highest 1h Outdoor	4.6E+6	4.5E+6	8.3E+5	1.5E+6	2.9E+6	1.7E+6
Highest 1 h Indoor ²	4.8E+5	3.8E+5	1.2E+5	1.1E+5	3.1E+5	1.8E+5
Highest 1h In/Out	0.11	0.10	0.13	0.11	0.11	0.01
Time of highest 1h Outdoor	12/8/14 16:17	12/9/14 20:40	12/10/14 18:48	12/11/14 22:19		
Corresponding highest 1h Indoor	12/8/14 17:28	12/9/14 23:38	12/10/14 20:00	12/11/14 22:44		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/8/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-9-PA-6. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.3–0.4 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	8.1E+4	8.9E+4	6.7E+4	1.7E+4	6.4E+4	2.8E+4
Outdoor 24 SD	1.3E+4	1.1E+4	3.3E+4	2.0E+4	1.9E+4	8.5E+3
Indoor 24h mean	7.0E+3	9.8E+3	8.0E+3	1.5E+3	6.6E+3	3.1E+3
Indoor 24 SD	1.2E+3	2.2E+3	3.2E+3	1.0E+3	1.9E+3	8.5E+2
24h mean In/Out	0.08	0.10	0.11	0.12	0.10	0.02
Highest 8h Outdoor	8.9E+4	9.9E+4	9.5E+4	3.3E+4	7.9E+4	2.7E+4
Highest 8h Indoor	7.3E+3	1.2E+4	1.0E+4	2.6E+3	8.1E+3	3.7E+3
Highest 8 h In/Out	0.08	0.13	0.11	0.08	0.10	0.02
Highest 1h Outdoor	1.0E+5	1.1E+5	1.0E+5	7.1E+4	9.6E+4	1.5E+4
Highest 1 h Indoor ²	7.3E+3	1.2E+4	1.0E+4	2.6E+3	9.5E+3	3.8E+3
Highest 1h In/Out	0.08	0.13	0.12	0.05	0.09	0.03
Time of highest 1h Outdoor	12/9/14 0:42	12/10/14 0:26	12/10/14 18:56	12/11/14 20:45		
Corresponding highest 1h Indoor	12/9/14 1:22	12/10/14 0:30	12/10/14 20:06	12/11/14 21:10		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/8/2014 19:00, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-9-PA-7. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.4–0.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	1.5E+4	2.4E+4	2.7E+4	2.5E+3	1.7E+4	9.4E+3
Outdoor 24 SD	4.4E+3	8.7E+3	1.6E+4	2.8E+3	8.1E+3	5.3E+3
Indoor 24h mean	1.0E+3	1.6E+3	1.4E+3	2.5E+2	1.1E+3	5.2E+2
Indoor 24 SD	1.8E+2	4.0E+2	6.5E+2	1.5E+2	3.5E+2	2.0E+2
24h mean In/Out	0.06	0.07	0.06	0.08	0.07	0.01
Highest 8h Outdoor	1.8E+4	3.4E+4	4.2E+4	6.0E+3	2.5E+4	1.4E+4
Highest 8h Indoor	1.0E+3	1.8E+3	1.9E+3	6.6E+2	1.3E+3	5.2E+2
Highest 8 h In/Out	0.06	0.05	0.05	0.11	0.07	0.03
Highest 1h Outdoor	2.2E+4	3.9E+4	5.1E+4	1.1E+4	3.1E+4	1.5E+4
Highest 1 h Indoor ²	1.0E+3	1.8E+3	1.9E+3	6.6E+2	1.5E+3	6.7E+2
Highest 1h In/Out	0.05	0.05	0.05	0.05	0.05	0.00
Time of highest 1h Outdoor	12/8/14 21:51	12/10/14 11:10	12/10/14 18:10	12/11/14 20:46		
Corresponding highest 1h Indoor	12/9/14 1:21	12/10/14 11:10	12/10/14 19:10	12/11/14 21:18		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/8/2014 19:00, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-9-PA-8. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.5–0.7 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	6.5E+3	1.5E+4	1.9E+4	1.4E+3	1.0E+4	7.0E+3
Outdoor 24 SD	2.4E+3	8.8E+3	1.3E+4	1.2E+3	6.3E+3	4.7E+3
Indoor 24h mean	5.3E+2	8.8E+2	7.7E+2	1.8E+2	5.9E+2	2.7E+2
Indoor 24 SD	9.0E+1	3.0E+2	3.7E+2	8.4E+1	2.1E+2	1.3E+2
24h mean In/Out	0.08	0.08	0.04	0.07	0.07	0.01
Highest 8h Outdoor	7.9E+3	2.5E+4	3.2E+4	3.8E+3	1.7E+4	1.2E+4
Highest 8h Indoor	5.3E+2	1.0E+3	1.1E+3	3.3E+2	7.4E+2	3.2E+2
Highest 8 h In/Out	0.07	0.04	0.03	0.09	0.06	0.02
Highest 1h Outdoor	1.0E+4	3.1E+4	4.1E+4	4.5E+3	2.2E+4	1.5E+4
Highest 1 h Indoor ²	5.3E+2	1.0E+3	1.1E+3	3.3E+2	8.6E+2	4.0E+2
Highest 1h In/Out	0.06	0.04	0.03	0.08	0.05	0.02
Time of highest 1h Outdoor	12/8/14 21:51	12/10/14 10:40	12/10/14 17:59	12/11/14 20:45		
Corresponding highest 1h Indoor	12/9/14 1:22	12/10/14 10:41	12/10/14 18:46	12/11/14 21:14		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/8/2014 19:00, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-9-PA-9. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.7–1.0 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	8.0E+2	2.2E+3	3.2E+3	3.4E+2	1.6E+3	1.1E+3
Outdoor 24 SD	4.0E+2	1.9E+3	2.1E+3	2.2E+2	1.1E+3	8.4E+2
Indoor 24h mean	9.6E+1	1.5E+2	1.2E+2	5.0E+1	1.0E+2	3.7E+1
Indoor 24 SD	3.9E+1	7.4E+1	4.9E+1	1.9E+1	4.5E+1	2.0E+1
24h mean In/Out	0.14	0.10	0.04	0.07	0.09	0.04
Highest 8h Outdoor	1.1E+3	4.4E+3	5.7E+3	7.5E+2	3.0E+3	2.1E+3
Highest 8h Indoor	2.0E+2	1.7E+2	1.7E+2	6.8E+1	1.5E+2	5.0E+1
Highest 8 h In/Out	0.17	0.04	0.03	0.09	0.08	0.06
Highest 1h Outdoor	1.4E+3	6.1E+3	7.1E+3	8.0E+2	3.9E+3	2.8E+3
Highest 1 h Indoor ²	2.0E+2	1.7E+2	1.7E+2	6.8E+1	1.6E+2	4.9E+1
Highest 1h In/Out	0.10	0.03	0.03	0.11	0.07	0.04
Time of highest 1h Outdoor	12/8/14 18:54	12/10/14 10:02	12/10/14 17:48	12/11/14 20:44		
Corresponding highest 1h Indoor	12/8/14 18:54	12/10/14 10:34	12/10/14 18:30	12/11/14 20:55		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/8/2014 19:00, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-9-PA-10. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 1.0–2.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	3.7E+2	7.2E+2	1.0E+3	2.1E+2	5.8E+2	3.2E+2
Outdoor 24 SD	2.1E+2	5.3E+2	5.0E+2	1.1E+2	3.4E+2	1.8E+2
Indoor 24h mean	4.9E+1	5.8E+1	5.1E+1	3.3E+1	4.8E+1	9.1E+0
Indoor 24 SD	3.7E+1	2.7E+1	1.1E+1	1.0E+1	2.1E+1	1.1E+1
24h mean In/Out	0.19	0.11	0.05	0.09	0.11	0.05
Highest 8h Outdoor	9.4E+2	1.3E+3	1.7E+3	5.1E+2	1.1E+3	4.4E+2
Highest 8h Indoor	1.6E+2	5.7E+1	5.6E+1	5.0E+1	8.1E+1	4.7E+1
Highest 8 h In/Out	0.17	0.05	0.03	0.10	0.09	0.05
Highest 1h Outdoor	9.4E+2	1.9E+3	2.0E+3	4.0E+2	1.3E+3	6.7E+2
Highest 1 h Indoor ²	1.6E+2	5.7E+1	5.6E+1	5.0E+1	9.1E+1	5.7E+1
Highest 1h In/Out	0.20	0.03	0.03	0.13	0.10	0.07
Time of highest 1h Outdoor	12/8/14 16:19	12/10/14 12:02	12/10/14 17:25	12/11/14 20:43		
Corresponding highest 1h Indoor	12/8/14 17:30	12/10/14 12:02	12/10/14 18:08	12/11/14 20:51		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/8/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-9-PA-11. Summary statistics for estimated PM_{2.5} concentrations (μg m⁻³) calculated from particle number concentrations resolved by size from 6 nm to 2.5 microns (as reported in Tables FW-9-PA-2 to FW-9-PA-9) and resulting indoor/outdoor ratios.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	1.8E+1	2.4E+1	2.2E+1	6.2E+0	1.8E+1	6.9E+0
Outdoor 24 SD	5.1E+0	7.3E+0	1.1E+1	3.8E+0	6.8E+0	2.8E+0
Indoor 24h mean	2.1E+0	2.3E+0	1.4E+0	6.9E-1	1.6E+0	6.3E-1
Indoor 24 SD	6.0E-1	7.7E-1	4.4E-1	3.3E-1	5.4E-1	1.7E-1
24h mean In/Out	0.13	0.11	0.07	0.09	0.10	0.02
Highest 8h Outdoor	6.1E+1	2.8E+1	3.4E+1	9.2E+0	3.3E+1	1.8E+1
Highest 8h Indoor	3.7E+0	1.8E+0	1.8E+0	1.0E+0	2.1E+0	9.8E-1
Highest 8 h In/Out	0.06	0.06	0.05	0.11	0.07	0.02
Highest 1h Outdoor	6.1E+1	3.5E+1	4.0E+1	1.4E+1	3.7E+1	1.6E+1
Highest 1 h Indoor ²	3.7E+0	1.8E+0	1.8E+0	1.0E+0	2.3E+0	1.1E+0
Highest 1h In/Out	0.07	0.05	0.05	0.09	0.07	0.02
Time of highest 1h Outdoor	12/8/14 16:18	12/10/14 12:02	12/10/14 17:43	12/11/14 20:44		
Corresponding highest 1h Indoor	12/8/14 17:29	12/10/14 12:02	12/10/14 18:52	12/11/14 21:05		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/8/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-9-PA-12. Summary statistics for concentrations of PM_{2.5} ($\mu\text{g m}^{-3}$) and indoor /outdoor ratios from measurements reported by TSI DustTrak II.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	5.0E-2	6.6E-2	5.6E-2	9.2E-3	4.5E-2	2.2E-2
Outdoor 24 SD	9.8E-3	1.5E-2	3.5E-2	1.0E-2	1.7E-2	1.1E-2
Indoor 24h mean	3.2E-3	4.0E-3	2.7E-3	2.8E-3	3.2E-3	5.2E-4
Indoor 24 SD	6.9E-4	1.6E-3	1.2E-3	4.5E-3	2.0E-3	1.5E-3
24h mean In/Out	0.07	0.06	0.05	0.11	0.07	0.02
Highest 8h Outdoor	5.5E-2	7.4E-2	9.0E-2	1.8E-2	5.9E-2	2.7E-2
Highest 8h Indoor	3.9E-3	3.0E-3	3.4E-3	3.3E-3	3.4E-3	3.1E-4
Highest 8 h In/Out	0.07	0.04	0.04	0.19	0.08	0.06
Highest 1h Outdoor	6.5E-2	8.5E-2	1.1E-1	3.6E-2	7.5E-2	2.9E-2
Highest 1 h Indoor ²	3.9E-3	3.0E-3	3.4E-3	3.3E-3	3.0E-3	1.4E-3
Highest 1h In/Out	0.06	0.03	0.04	0.03	0.04	0.01
Time of highest 1h Outdoor	12/8/14 21:47	12/10/14 11:59	12/10/14 18:04	12/11/14 20:50		
Corresponding highest 1h Indoor	12/8/14 22:20	12/10/14 12:17	12/10/14 19:28	12/11/14 20:58		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/8/2014 19:00, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-9-PA-13. Daily¹ summary statistics for concentrations (nanograms m^{-3}) and indoor /outdoor ratios of aerosol black carbon measured using the Aethalometer AE22.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	1.5E+3	1.4E+3	5.2E+2	3.2E+2	9.4E+2	5.2E+2
Outdoor 24 SD	5.8E+2	7.8E+2	2.2E+2	2.2E+2	4.5E+2	2.4E+2
Indoor 24h mean	2.3E+2	2.1E+2	5.9E+1	6.3E+1	1.4E+2	7.8E+1
Indoor 24 SD	9.2E+1	1.3E+2	4.2E+1	3.5E+1	7.4E+1	3.8E+1
24h mean In/Out	0.15	0.15	0.13	0.16	0.15	0.01
Highest 8h Outdoor	1.7E+3	2.4E+3	8.0E+2	4.7E+2	1.3E+3	7.5E+2
Highest 8h Indoor	2.8E+2	3.6E+2	9.1E+1	8.8E+1	2.1E+2	1.2E+2
Highest 8 h In/Out	0.17	0.15	0.11	0.19	0.16	0.03
Highest 1h Outdoor	2.5E+3	3.3E+3	8.6E+2	7.6E+2	1.9E+3	1.1E+3
Highest 1 h Indoor ²	2.8E+2	3.6E+2	9.1E+1	8.8E+1	2.5E+2	1.5E+2
Highest 1h In/Out	0.14	0.14	0.09	0.17	0.13	0.03
Time of highest 1h Outdoor	12/9/14 8:33	12/9/14 20:12	12/10/14 18:39	12/11/14 20:00		
Corresponding highest 1h Indoor	12/9/14 9:42	12/9/14 23:42	12/10/14 22:39	12/11/14 23:00		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/8/2014 19:00, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Appendix FW-10-PM. Results for Portable Air Cleaners, Medium Speed, December 12-15, 2014.

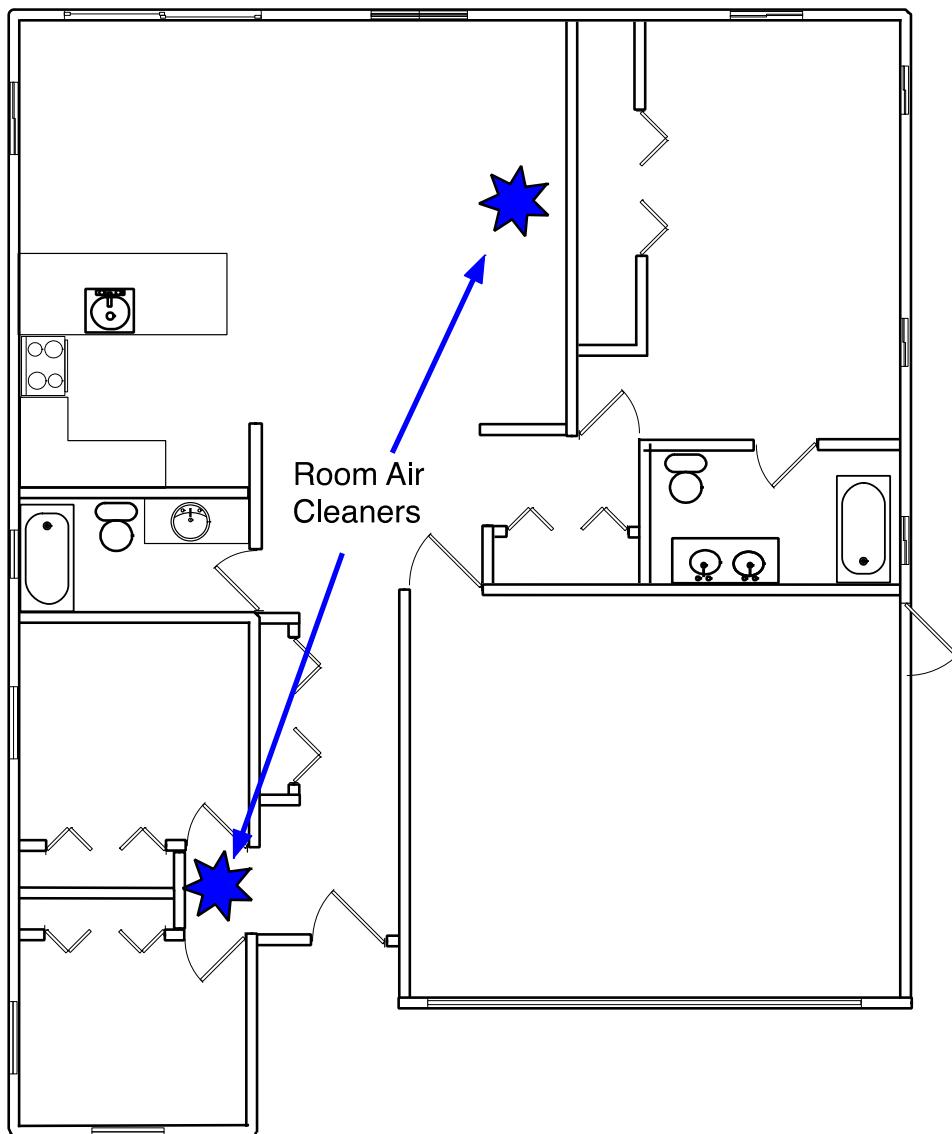


Table FW-10-PM-1. Description of **Portable Air Cleaners, Medium Speed** component characteristics during the period of **December 12-15, 2014**

System Parameter	Description or Measured Value
Heating	75,000 BTU/h, 80% eff., gas furnace, 1-stage burner
Cooling	3 ton, SEER13 air conditioner
Thermal distribution	Central fan with PSC motor: 1200 cfm for cooling, 1074 cfm for heating
Ventilation	Exhaust fan in main bathroom with ECM; Set to 38 cfm continuous
Filtration	MERV4, 1" (Purolator F312) filter installed at return air ceiling grill of forced air furnace. Some particle removal as air infiltrates through building envelope to replace air exiting home through continuous exhaust fan in bathroom. Two portable room air cleaners (RabbitAir MinusA2 SPA-780A) set to medium speed.
Recirculation blower schedule	As required for thermal conditioning, no fan cycler.
VOC removal system	None

Notes about this monitoring period

We lost an aethalometer near the end of the operating period. The black carbon indoor / outdoor data stream was constructed using both instruments until the problem occurred and the remaining instrument afterward. All of the other instruments were functioning normally.

The 24 h running statistics in the figures starts at 12/12/2014 18:00.

There was rain throughout the day of 12/15/2014. There was fog on the days of 12/13/2014, and 12/14/2014.

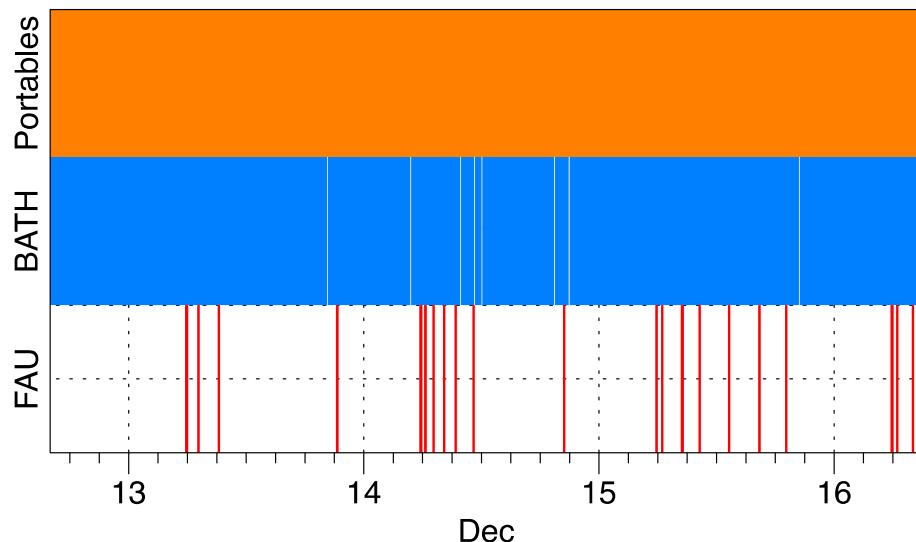


Figure FW-10-PM-1. Operation of mechanical systems: Portable air cleaners; Bath exhaust fan; fan on central forced air unit (FAU).

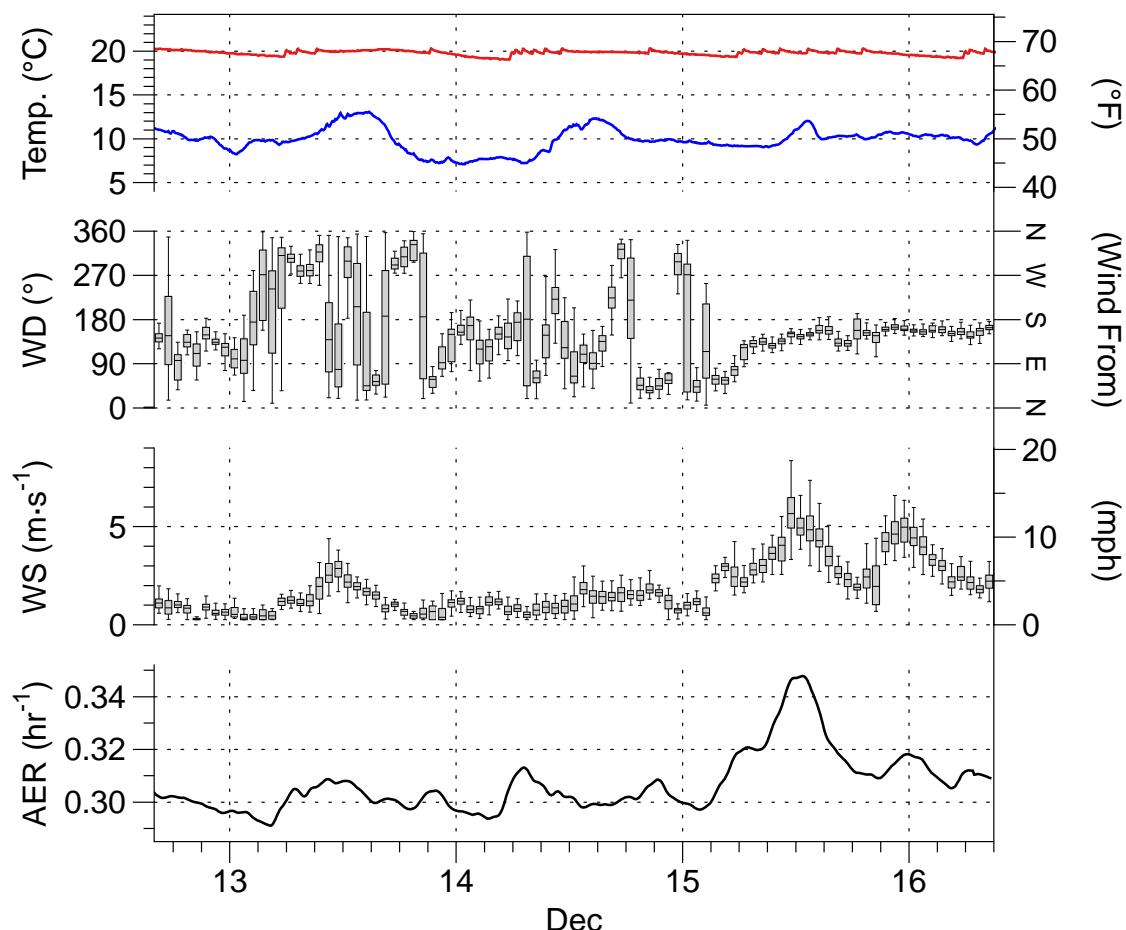


Figure FW-10-PM-2. Environmental parameters measured during operation of Portable Air Cleaners, Medium Speed, Dec 12-15, 2014. From top to bottom: indoor (red) and outdoor (blue) temperatures, wind direction (WD) in units of degrees from North, wind speed (WS), and air exchange rate (AER). For WD and WS, the box for each hour shows the 25th, 50th and 75th percentiles of the measured values and whiskers extend 1.5X the interquartile range (75th-25th percentile values) above the 75th and below the 25th percentile values.

Guide to plots of pollutant concentration time series and indoor / outdoor (I/O) ratios

The bottom section of each plot shows outdoor and indoor time series using the resolution of data collection: 3-min for black carbon and 1-min for all other parameters. The top and bottom of grey band are LOESS-smoothed, 1-min (or 3-min for black carbon) time-series. Also shown are time series with 1h and 24h time averaging for most pollutants. Triangles in bottom of plot indicate the highest 1h outdoor and corresponding highest 1h indoor average during each day. The top section of each plot shows the ratio of indoor to outdoor running 24h mean values (8h for ozone) and the ratios of highest 1h indoor to corresponding highest 1h outdoor concentration each day.

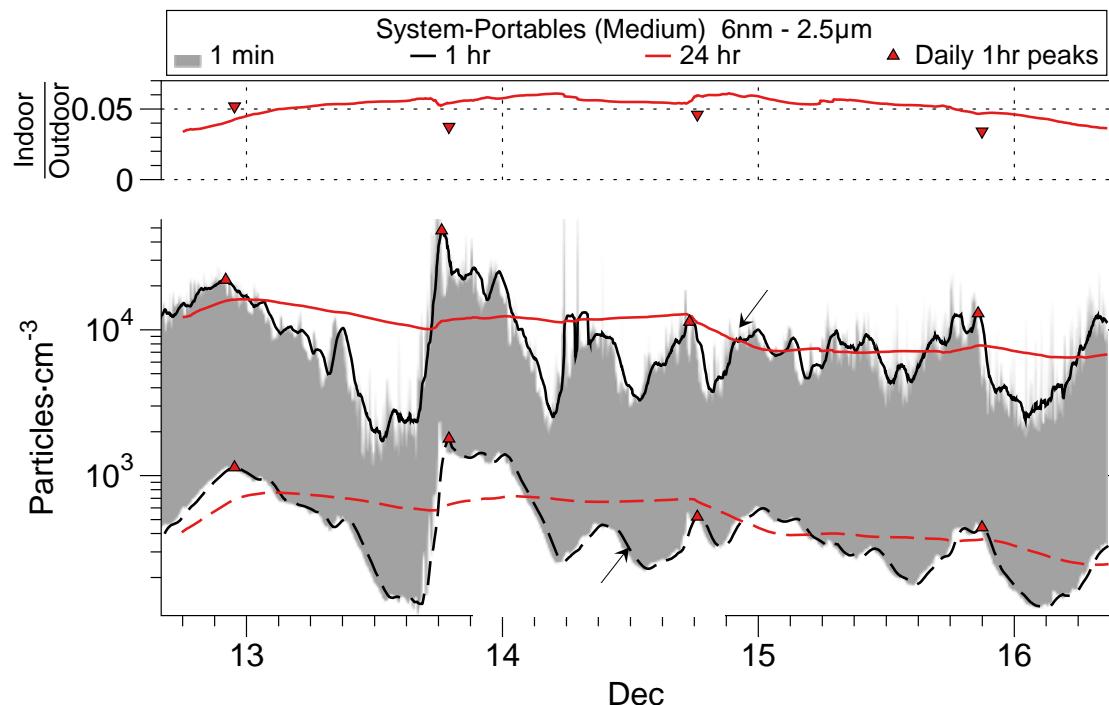


Figure FW-10-PM-3. Number concentrations of 6 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of Portable Air Cleaners, Medium Speed, Dec 12-15, 2014. Data collected using TSI 3787 CPCs.

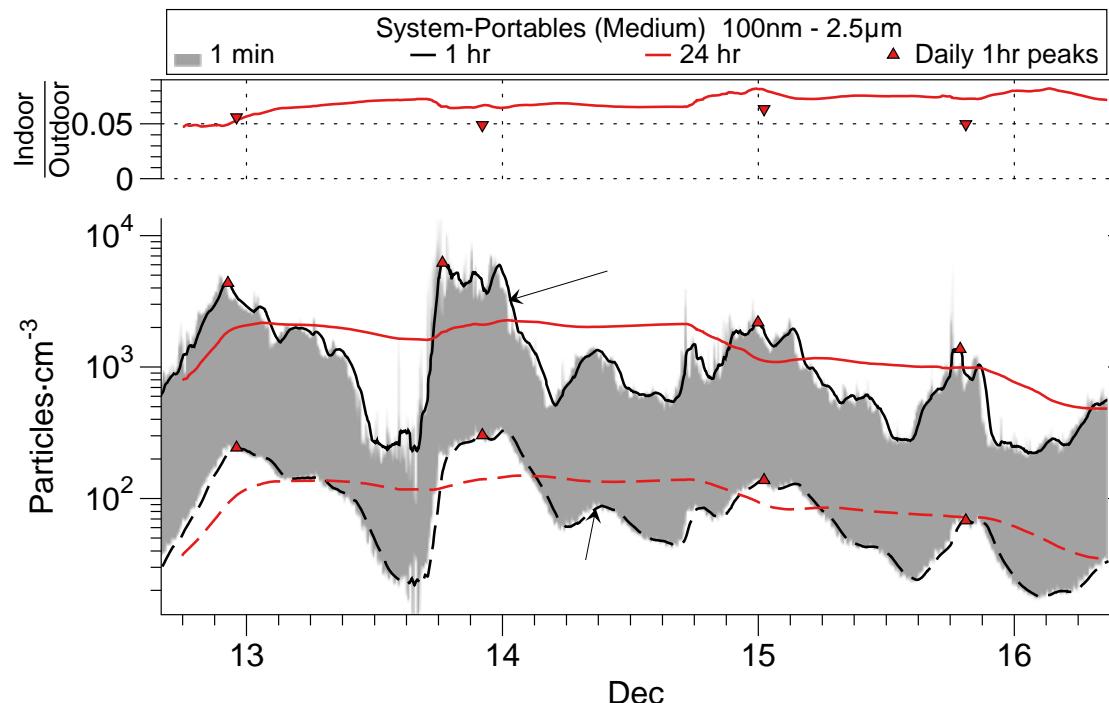


Figure FW-10-PM-4. Number concentrations of 100 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of Portable Air Cleaners, Medium Speed, Dec 12-15, 2014. Data collected using TSI 3781 CPCs outfitted with screens to exclude particles smaller than 100 nm. Refer to “Guide” before Figure FW-10-PM-3.

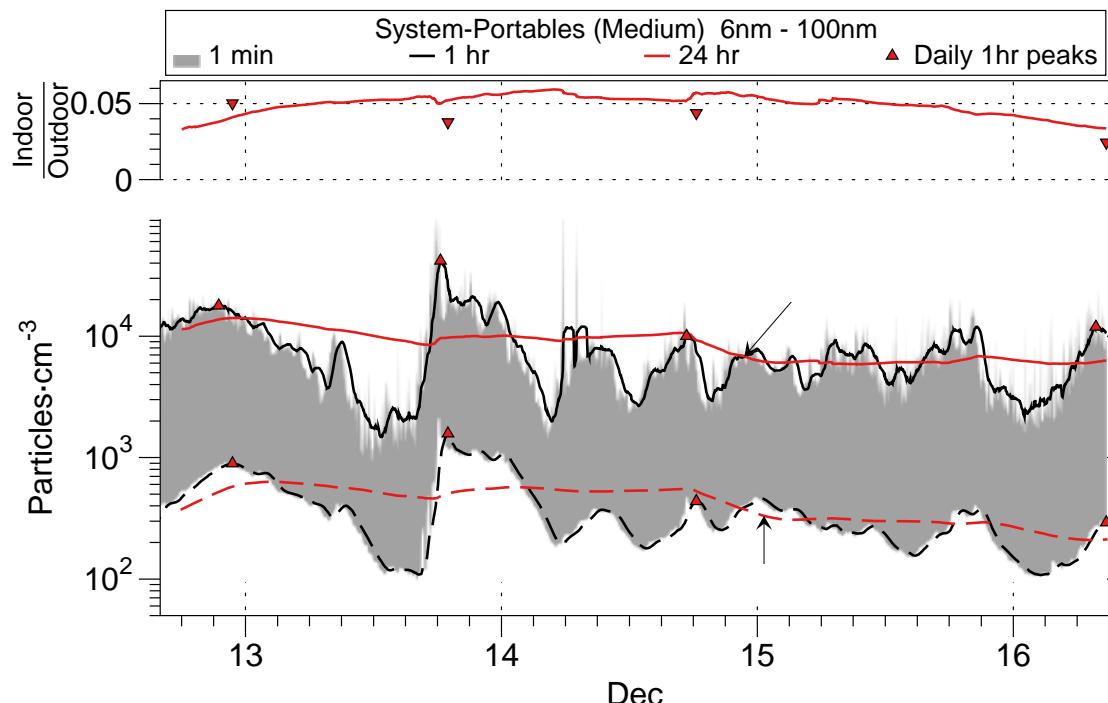


Figure FW-10-PM-5. Number concentrations of 6–100 nm diameter particles measured outdoors and indoors during operation of Portable Air Cleaners, Medium Speed, Dec 12–15, 2014. Data obtained as the difference between time series show in prior two figures. Refer to “Guide” before Figure FW-10-PM-3.

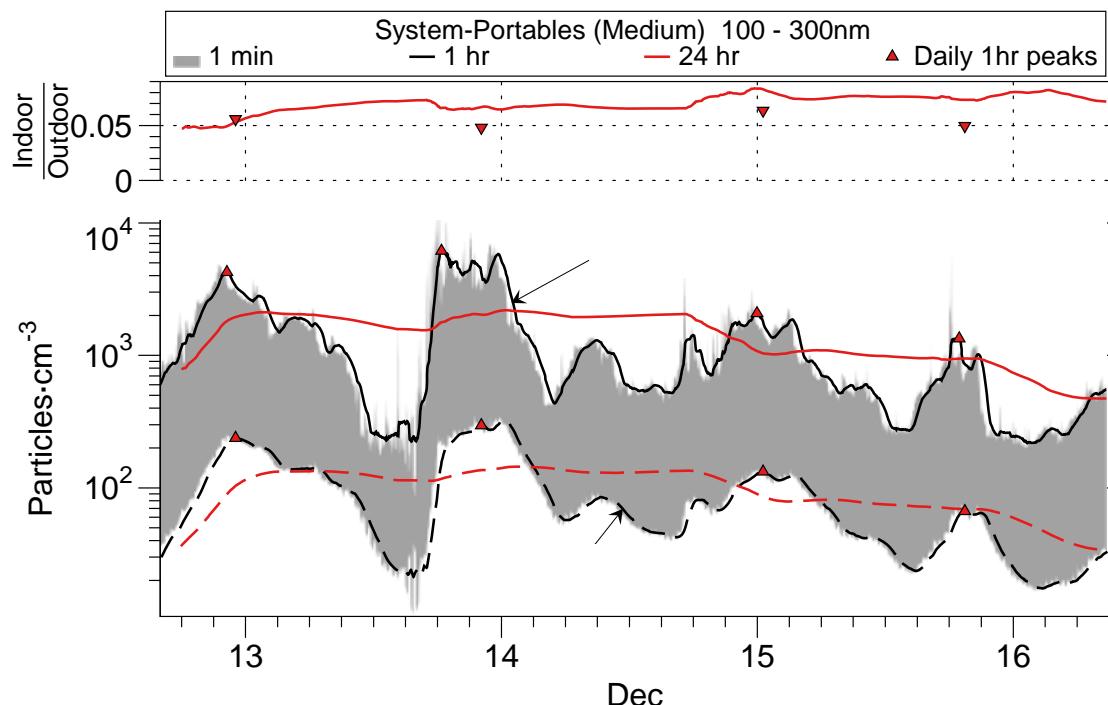


Figure FW-10-PM-6. Number concentrations of 100–300 nm diameter particles measured outdoors and indoors during operation of Portable Air Cleaners, Medium Speed, Dec 12–15, 2014. Data obtained as the difference between the TSI 3781 CPC with size selector and the MetOne BT637S OPC. Refer to “Guide” before Figure FW-10-PM-3.

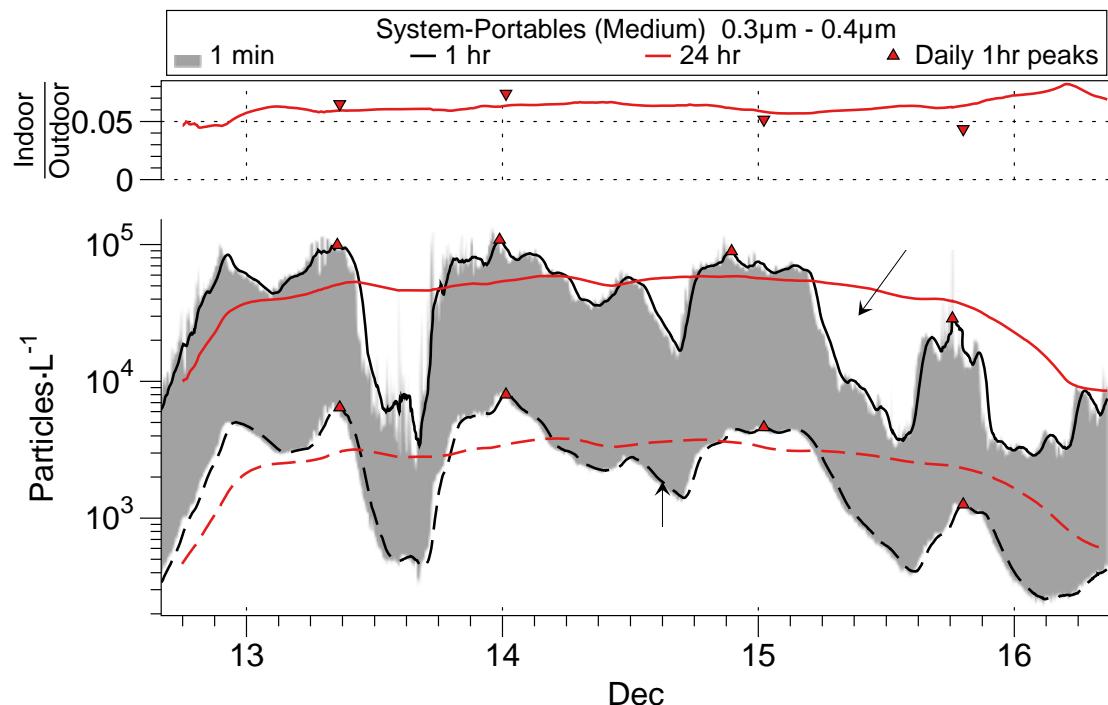


Figure FW-10-PM-7. Number concentrations of 0.3–0.4 μm diameter particles measured outdoors and indoors during operation of Portable Air Cleaners, Medium Speed, Dec 12-15, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-10-PM-3.

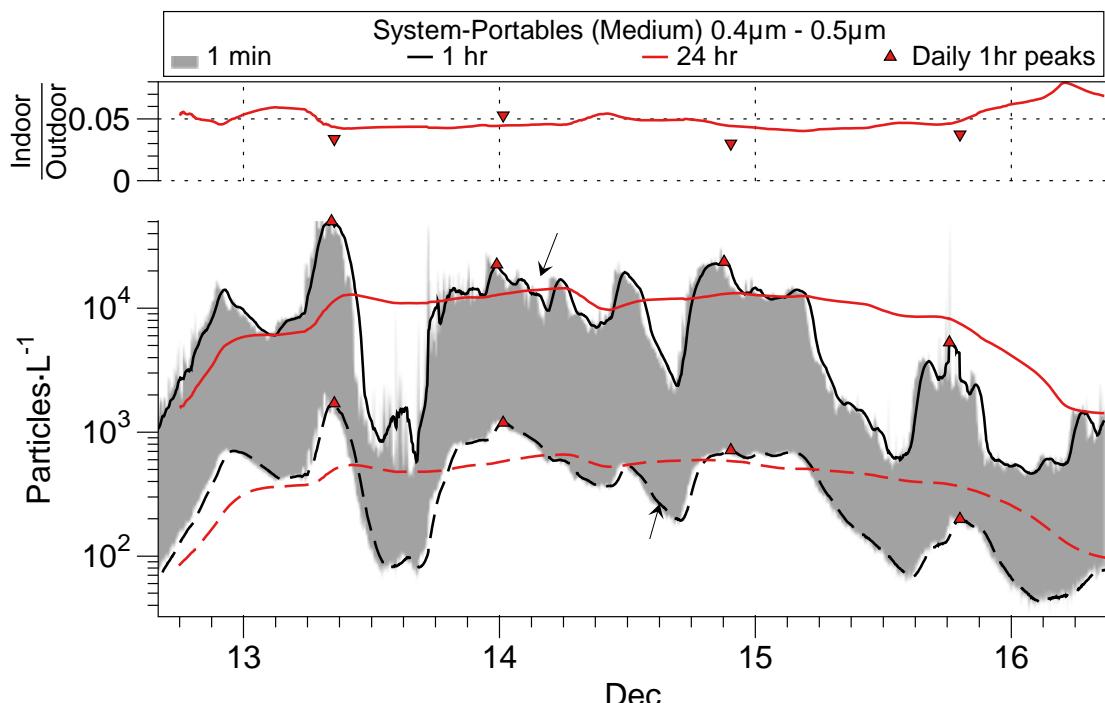


Figure FW-10-PM-8. Number concentrations of 0.4–0.5 μm diameter particles measured outdoors and indoors during operation of Portable Air Cleaners, Medium Speed, Dec 12-15, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-10-PM-3.

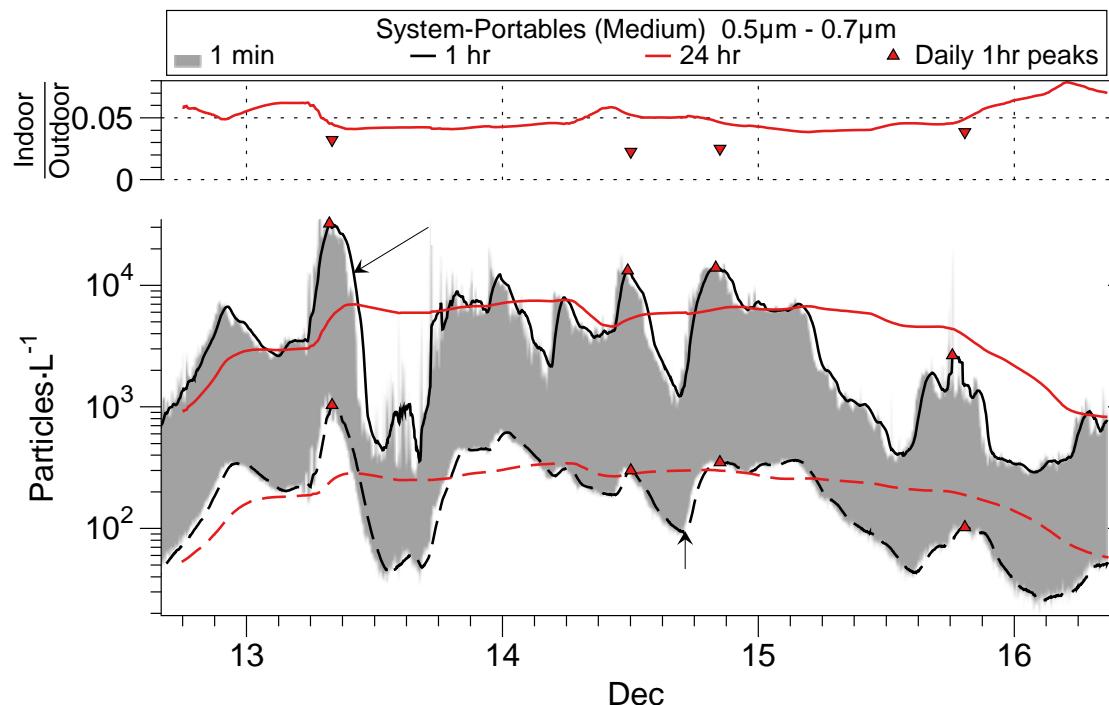


Figure FW-10-PM-9. Number concentrations of 0.5–0.7 μm diameter particles measured outdoors and indoors during operation of Portable Air Cleaners, Medium Speed, Dec 12-15, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-10-PM-3.

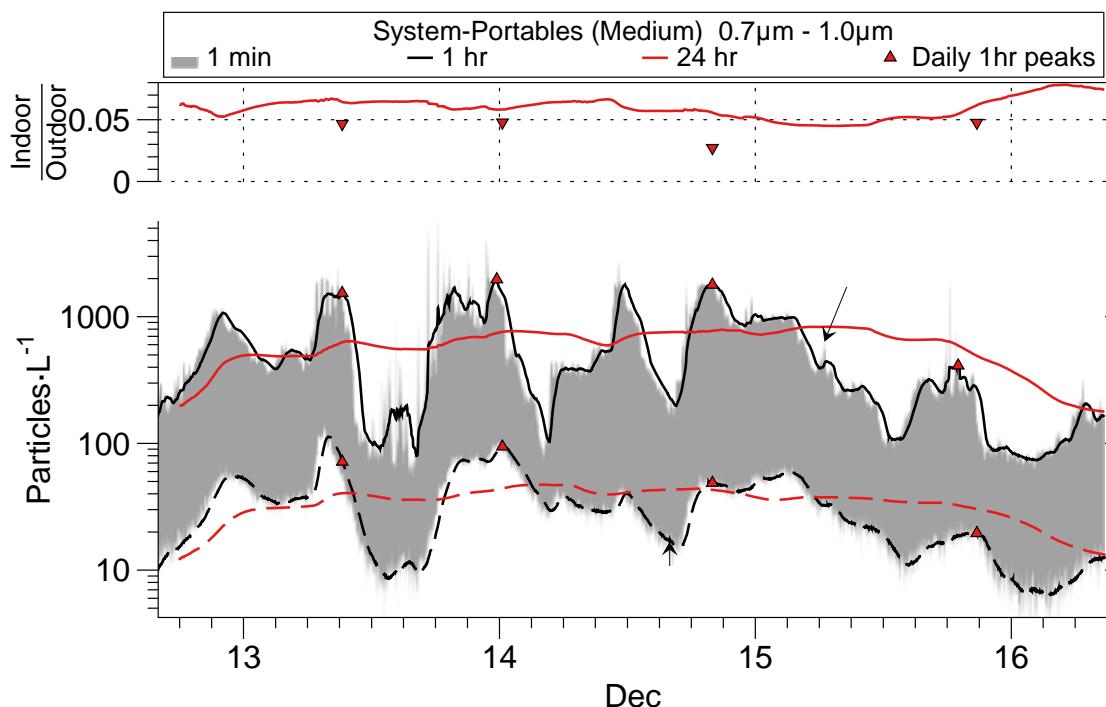


Figure FW-10-PM-10. Number concentrations of 0.7–1.0 μm diameter particles measured outdoors and indoors during operation of Portable Air Cleaners, Medium Speed, Dec 12-15, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-10-PM-3.

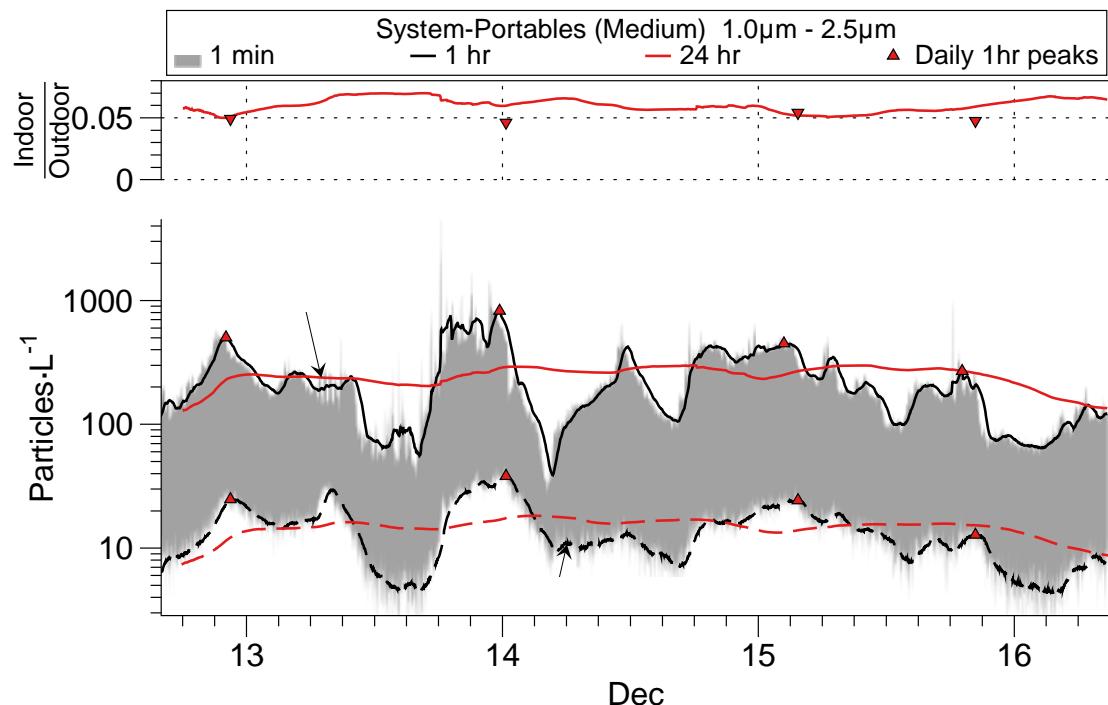


Figure FW-10-PM-11. Number concentrations of 1.0–2.5 μm diameter particles measured outdoors and indoors during operation of Portable Air Cleaners, Medium Speed, Dec 12-15, 2014. Data collected using MetOne BT637S particle counters. Refer to Figure FW-10-PM-3 for details.

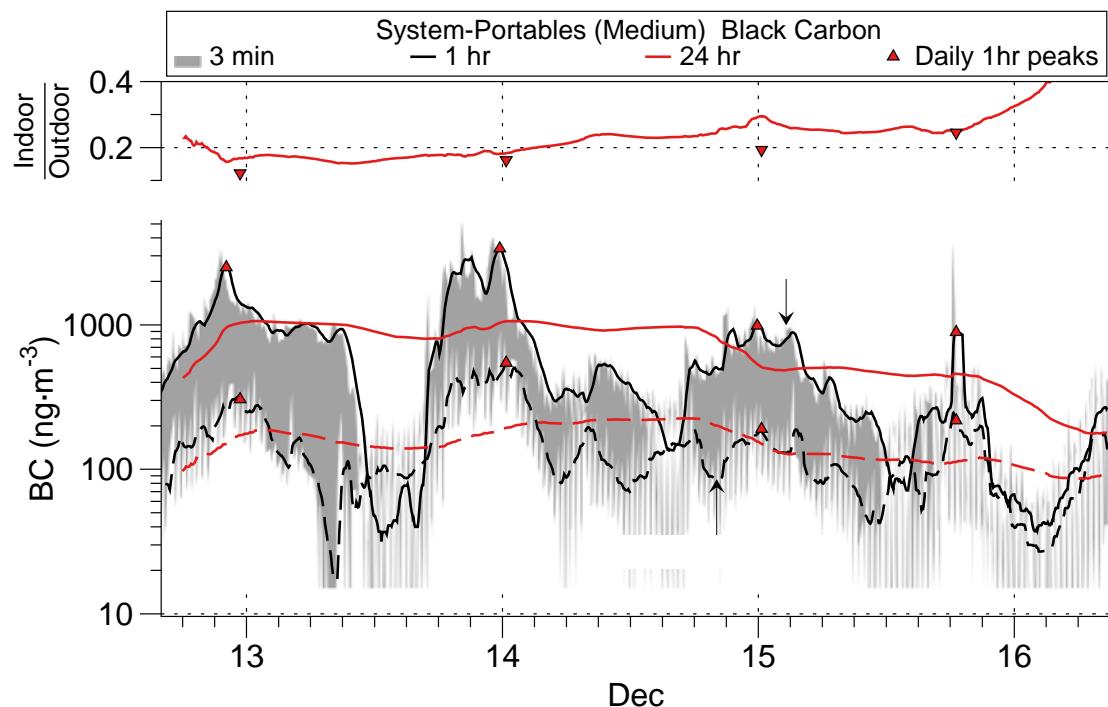


Figure FW-10-PM-12. Black carbon concentrations measured outdoors and indoors during operation of Portable Air Cleaners, Medium Speed, Dec 12-15, 2014. Data collected using AE22 Aethalometers with 3-min samples. Data otherwise as described in Figure FW-10-PM-3 caption.

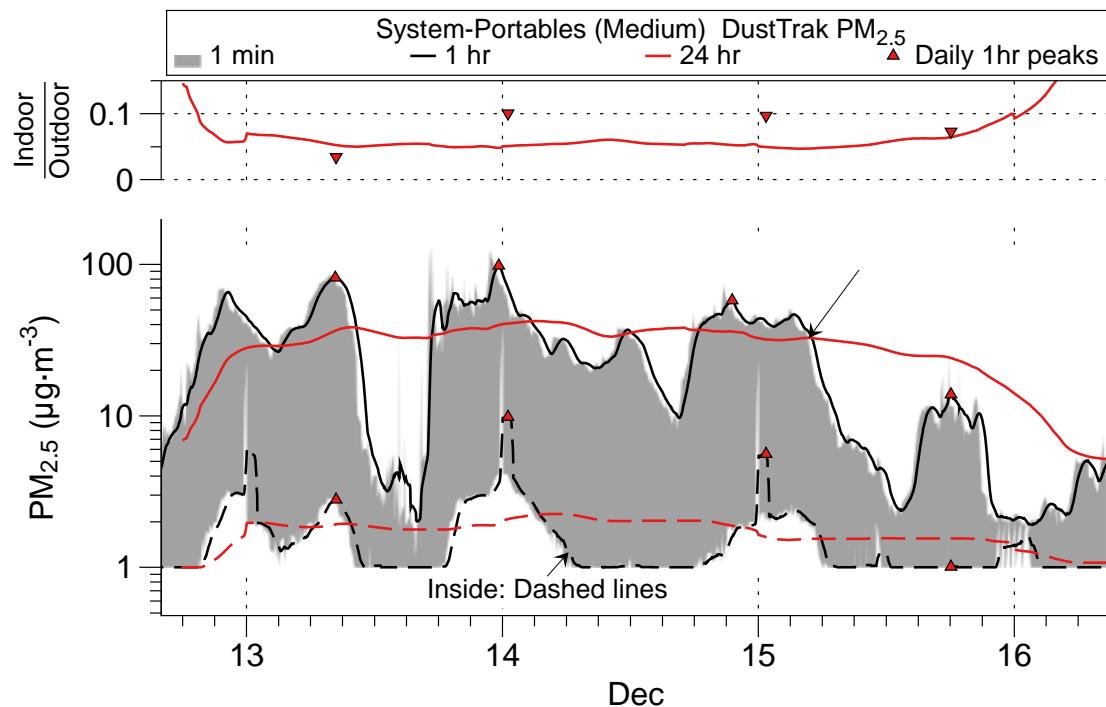


Figure FW-10-PM-13. PM_{2.5} reported by TSI DustTrak II 8530 measurements outdoors and indoors during operation of Portable Air Cleaners, Medium Speed, Dec 12-15, 2014. The DustTrak measures light scattering and uses a calibration to estimate PM_{2.5} mass. Refer to “Guide” before Figure FW-10-PM-3.

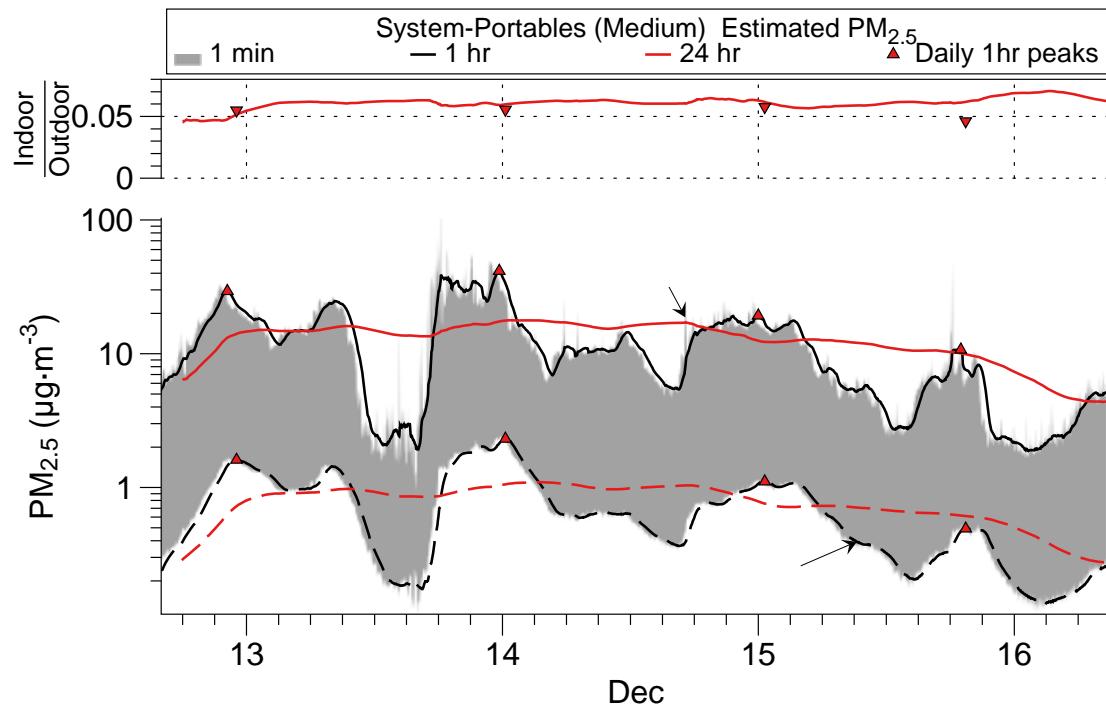


Figure FW-10-PM-14. Estimated PM_{2.5} concentration calculated from size-resolved particle number concentrations measured by MetOne and CPC during operation of Portable Air Cleaners, Medium Speed, Dec 12-15, 2014. Details provided in body of report. Refer to “Guide” before Figure FW-10-PM-3.

Table FW-10-PM-2. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6 nm to 2.5 micron measured using the TSI 3787 CPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	1.1E+4	1.2E+4	7.1E+3	6.8E+3	9.4E+3	2.4E+3
Outdoor 24 SD	6.0E+3	1.3E+4	2.5E+3	4.1E+3	6.4E+3	4.1E+3
Indoor 24h mean	6.3E+2	6.7E+2	3.8E+2	2.4E+2	4.8E+2	1.8E+2
Indoor 24 SD	2.8E+2	5.1E+2	1.1E+2	9.9E+1	2.5E+2	1.7E+2
24h mean In/Out	0.05	0.06	0.06	0.05	0.05	0.01
Highest 8h Outdoor	1.8E+4	2.4E+4	8.0E+3	8.7E+3	1.5E+4	6.7E+3
Highest 8h Indoor	9.5E+2	1.3E+3	3.5E+2	3.2E+2	7.4E+2	4.3E+2
Highest 8 h In/Out	0.05	0.06	0.04	0.04	0.05	0.01
Highest 1h Outdoor	2.2E+4	4.8E+4	1.1E+4	1.3E+4	2.4E+4	1.5E+4
Highest 1 h Indoor ²	9.5E+2	1.3E+3	3.5E+2	3.2E+2	9.7E+2	5.5E+2
Highest 1h In/Out	0.05	0.04	0.05	0.03	0.04	0.01
Time of highest 1h Outdoor	12/12/14 22:03	12/13/14 18:18	12/14/14 17:33	12/15/14 20:37		
Corresponding highest 1h Indoor	12/12/14 22:52	12/13/14 18:59	12/14/14 18:17	12/15/14 20:59		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/12/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-10-PM-3. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100 nm to 2.5 micron measured using the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	1.7E+3	2.1E+3	1.0E+3	4.9E+2	1.3E+3	6.1E+2
Outdoor 24 SD	1.1E+3	2.1E+3	5.9E+2	3.7E+2	1.0E+3	6.7E+2
Indoor 24h mean	1.2E+2	1.4E+2	7.8E+1	3.4E+1	9.2E+1	4.0E+1
Indoor 24 SD	6.6E+1	1.0E+2	3.4E+1	1.6E+1	5.5E+1	3.3E+1
24h mean In/Out	0.06	0.07	0.07	0.08	0.07	0.01
Highest 8h Outdoor	2.8E+3	4.6E+3	1.7E+3	7.4E+2	2.5E+3	1.4E+3
Highest 8h Indoor	1.9E+2	2.7E+2	1.2E+2	4.9E+1	1.6E+2	8.2E+1
Highest 8 h In/Out	0.07	0.06	0.07	0.07	0.07	0.00
Highest 1h Outdoor	4.4E+3	6.2E+3	2.2E+3	1.4E+3	3.5E+3	1.9E+3
Highest 1 h Indoor ²	1.9E+2	2.7E+2	1.2E+2	4.9E+1	1.9E+2	9.1E+1
Highest 1h In/Out	0.06	0.05	0.06	0.05	0.05	0.01
Time of highest 1h Outdoor	12/12/14 22:15	12/13/14 18:23	12/14/14 23:58	12/15/14 18:56		
Corresponding highest 1h Indoor	12/12/14 23:03	12/13/14 22:07	12/15/14 0:32	12/15/14 19:28		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/12/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-10-PM-4. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6–100 nm based on difference between concentrations measured using the TSI 3787 CPC and the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	9.7E+3	1.0E+4	6.1E+3	6.3E+3	8.0E+3	1.8E+3
Outdoor 24 SD	5.2E+3	1.2E+4	2.3E+3	3.8E+3	5.7E+3	3.5E+3
Indoor 24h mean	5.1E+2	5.3E+2	3.0E+2	2.1E+2	3.9E+2	1.4E+2
Indoor 24 SD	2.2E+2	4.2E+2	8.1E+1	8.4E+1	2.0E+2	1.4E+2
24h mean In/Out	0.04	0.05	0.05	0.04	0.05	0.01
Highest 8h Outdoor	1.5E+4	2.0E+4	7.0E+3	8.0E+3	1.2E+4	5.2E+3
Highest 8h Indoor	7.6E+2	1.1E+3	2.8E+2	2.7E+2	6.0E+2	3.4E+2
Highest 8 h In/Out	0.05	0.05	0.04	0.03	0.04	0.01
Highest 1h Outdoor	1.8E+4	4.2E+4	1.0E+4	1.2E+4	2.0E+4	1.3E+4
Highest 1 h Indoor ²	7.6E+2	1.1E+3	2.8E+2	2.7E+2	8.0E+2	5.0E+2
Highest 1h In/Out	0.05	0.04	0.04	0.02	0.04	0.01
Time of highest 1h Outdoor	12/12/14 21:29	12/13/14 18:17	12/14/14 17:21	12/16/14 7:45		
Corresponding highest 1h Indoor	12/12/14 22:46	12/13/14 18:59	12/14/14 18:17	12/16/14 8:44		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/12/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-10-PM-5. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100–300 nm based on difference between concentrations measured using the TSI 3781 CPC with size selector and the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	1.6E+6	2.0E+6	9.7E+5	4.8E+5	1.3E+6	5.9E+5
Outdoor 24 SD	1.1E+6	2.1E+6	5.6E+5	3.6E+5	1.0E+6	6.7E+5
Indoor 24h mean	1.2E+5	1.3E+5	7.4E+4	3.3E+4	8.9E+4	3.9E+4
Indoor 24 SD	6.5E+4	9.9E+4	3.2E+4	1.6E+4	5.3E+4	3.2E+4
24h mean In/Out	0.06	0.07	0.07	0.08	0.07	0.01
Highest 8h Outdoor	2.8E+6	4.5E+6	1.6E+6	7.2E+5	2.4E+6	1.4E+6
Highest 8h Indoor	1.9E+5	2.6E+5	1.1E+5	4.8E+4	1.5E+5	8.0E+4
Highest 8 h In/Out	0.07	0.06	0.07	0.07	0.07	0.00
Highest 1h Outdoor	4.3E+6	6.2E+6	2.1E+6	1.3E+6	3.5E+6	1.9E+6
Highest 1 h Indoor ²	1.9E+5	2.6E+5	1.1E+5	4.8E+4	1.8E+5	8.9E+4
Highest 1h In/Out	0.06	0.05	0.06	0.05	0.05	0.01
Time of highest 1h Outdoor	12/12/14 22:15	12/13/14 18:23	12/14/14 23:58	12/15/14 18:56		
Corresponding highest 1h Indoor	12/12/14 23:03	12/13/14 22:07	12/15/14 0:32	12/15/14 19:28		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/12/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-10-PM-6. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.3–0.4 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	4.8E+4	5.5E+4	4.2E+4	9.0E+3	3.9E+4	1.8E+4
Outdoor 24 SD	3.0E+4	2.9E+4	2.8E+4	9.1E+3	2.4E+4	8.7E+3
Indoor 24h mean	2.9E+3	3.5E+3	2.7E+3	5.6E+2	2.4E+3	1.1E+3
Indoor 24 SD	1.8E+3	2.2E+3	1.4E+3	3.2E+2	1.4E+3	7.0E+2
24h mean In/Out	0.06	0.06	0.06	0.07	0.06	0.00
Highest 8h Outdoor	7.4E+4	8.4E+4	7.2E+4	1.6E+4	6.1E+4	2.7E+4
Highest 8h Indoor	4.2E+3	6.2E+3	4.3E+3	8.9E+2	3.9E+3	1.9E+3
Highest 8 h In/Out	0.06	0.07	0.06	0.06	0.06	0.01
Highest 1h Outdoor	9.9E+4	1.1E+5	9.0E+4	2.9E+4	8.1E+4	3.1E+4
Highest 1 h Indoor ²	4.2E+3	6.2E+3	4.3E+3	8.9E+2	5.1E+3	2.5E+3
Highest 1h In/Out	0.06	0.07	0.05	0.04	0.06	0.01
Time of highest 1h Outdoor	12/13/14 8:30	12/13/14 23:44	12/14/14 21:30	12/15/14 18:12		
Corresponding highest 1h Indoor	12/13/14 8:44	12/14/14 0:20	12/15/14 0:31	12/15/14 19:13		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/12/2014 18:00, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-10-PM-7. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.4–0.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	1.2E+4	1.1E+4	9.0E+3	1.5E+3	8.4E+3	4.1E+3
Outdoor 24 SD	1.4E+4	6.4E+3	7.2E+3	2.1E+3	7.3E+3	4.1E+3
Indoor 24h mean	5.0E+2	5.6E+2	4.2E+2	9.2E+1	3.9E+2	1.8E+2
Indoor 24 SD	4.1E+2	3.2E+2	2.2E+2	4.8E+1	2.5E+2	1.4E+2
24h mean In/Out	0.05	0.05	0.04	0.06	0.05	0.01
Highest 8h Outdoor	2.3E+4	2.1E+4	1.7E+4	2.6E+3	1.6E+4	8.0E+3
Highest 8h Indoor	8.2E+2	7.4E+2	6.7E+2	1.4E+2	5.9E+2	2.7E+2
Highest 8 h In/Out	0.04	0.04	0.04	0.05	0.04	0.01
Highest 1h Outdoor	5.0E+4	2.3E+4	2.4E+4	5.3E+3	2.5E+4	1.6E+4
Highest 1 h Indoor ²	8.2E+2	7.4E+2	6.7E+2	1.4E+2	9.5E+2	5.6E+2
Highest 1h In/Out	0.03	0.05	0.03	0.04	0.04	0.01
Time of highest 1h Outdoor	12/13/14 8:15	12/13/14 23:45	12/14/14 21:05	12/15/14 18:12		
Corresponding highest 1h Indoor	12/13/14 8:30	12/14/14 0:21	12/14/14 21:42	12/15/14 19:12		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/12/2014 18:00, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-10-PM-8. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.5–0.7 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	6.2E+3	5.7E+3	4.8E+3	8.5E+2	4.4E+3	2.1E+3
Outdoor 24 SD	8.5E+3	4.0E+3	3.9E+3	9.7E+2	4.4E+3	2.7E+3
Indoor 24h mean	2.6E+2	2.9E+2	2.2E+2	5.3E+1	2.0E+2	9.1E+1
Indoor 24 SD	2.4E+2	1.6E+2	1.1E+2	2.4E+1	1.3E+2	7.9E+1
24h mean In/Out	0.05	0.05	0.04	0.06	0.05	0.01
Highest 8h Outdoor	1.3E+4	1.2E+4	9.1E+3	1.4E+3	8.9E+3	4.6E+3
Highest 8h Indoor	4.4E+2	4.0E+2	3.3E+2	7.7E+1	3.1E+2	1.4E+2
Highest 8 h In/Out	0.03	0.03	0.04	0.06	0.04	0.01
Highest 1h Outdoor	3.2E+4	1.3E+4	1.4E+4	2.6E+3	1.5E+4	1.1E+4
Highest 1 h Indoor ²	4.4E+2	4.0E+2	3.3E+2	7.7E+1	4.5E+2	3.5E+2
Highest 1h In/Out	0.03	0.02	0.03	0.04	0.03	0.01
Time of highest 1h Outdoor	12/13/14 7:46	12/14/14 11:45	12/14/14 20:01	12/15/14 18:12		
Corresponding highest 1h Indoor	12/13/14 8:01	12/14/14 12:02	12/14/14 20:24	12/15/14 19:22		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/12/2014 18:00, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-10-PM-9. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.7–1.0 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	5.8E+2	7.3E+2	6.8E+2	1.7E+2	5.4E+2	2.2E+2
Outdoor 24 SD	4.4E+2	6.6E+2	4.7E+2	1.3E+2	4.3E+2	1.9E+2
Indoor 24h mean	3.7E+1	4.2E+1	3.5E+1	1.2E+1	3.2E+1	1.2E+1
Indoor 24 SD	2.5E+1	2.5E+1	1.5E+1	4.8E+0	1.7E+1	8.4E+0
24h mean In/Out	0.06	0.06	0.05	0.07	0.06	0.01
Highest 8h Outdoor	8.6E+2	1.3E+3	1.2E+3	2.7E+2	8.9E+2	3.9E+2
Highest 8h Indoor	5.5E+1	7.2E+1	5.1E+1	2.4E+1	5.1E+1	1.7E+1
Highest 8 h In/Out	0.06	0.06	0.04	0.09	0.06	0.02
Highest 1h Outdoor	1.5E+3	2.0E+3	1.8E+3	4.1E+2	1.4E+3	6.1E+2
Highest 1 h Indoor ²	5.5E+1	7.2E+1	5.1E+1	2.4E+1	5.9E+1	2.8E+1
Highest 1h In/Out	0.05	0.05	0.03	0.05	0.04	0.01
Time of highest 1h Outdoor	12/13/14 9:15	12/13/14 23:45	12/14/14 19:58	12/15/14 19:02		
Corresponding highest 1h Indoor	12/13/14 9:15	12/14/14 0:17	12/14/14 19:58	12/15/14 20:46		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/12/2014 18:00, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-10-PM-10. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 1.0–2.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	2.2E+2	2.9E+2	2.8E+2	1.3E+2	2.3E+2	6.3E+1
Outdoor 24 SD	1.1E+2	3.1E+2	1.2E+2	6.9E+1	1.5E+2	9.3E+1
Indoor 24h mean	1.5E+1	1.6E+1	1.6E+1	7.9E+0	1.4E+1	3.4E+0
Indoor 24 SD	6.9E+0	1.1E+1	5.4E+0	3.2E+0	6.5E+0	2.7E+0
24h mean In/Out	0.06	0.06	0.06	0.06	0.06	0.00
Highest 8h Outdoor	3.0E+2	5.6E+2	4.0E+2	2.0E+2	3.7E+2	1.3E+2
Highest 8h Indoor	1.9E+1	3.0E+1	2.1E+1	1.5E+1	2.1E+1	5.5E+0
Highest 8 h In/Out	0.06	0.05	0.05	0.07	0.06	0.01
Highest 1h Outdoor	5.0E+2	8.3E+2	4.5E+2	2.7E+2	5.1E+2	2.0E+2
Highest 1 h Indoor ²	1.9E+1	3.0E+1	2.1E+1	1.5E+1	2.5E+1	9.0E+0
Highest 1h In/Out	0.05	0.05	0.05	0.05	0.05	0.00
Time of highest 1h Outdoor	12/12/14 22:04	12/13/14 23:44	12/15/14 2:24	12/15/14 19:07		
Corresponding highest 1h Indoor	12/12/14 22:29	12/14/14 0:20	12/15/14 3:43	12/15/14 20:22		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/12/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-10-PM-11. Summary statistics for estimated PM_{2.5} concentrations (μg m⁻³) calculated from particle number concentrations resolved by size from 6 nm to 2.5 microns (as reported in Tables FW-10-PM-2 to FW-10-PM-9) and resulting indoor/outdoor ratios.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	1.4E+1	1.6E+1	1.1E+1	4.4E+0	1.2E+1	4.6E+0
Outdoor 24 SD	7.6E+0	1.3E+1	5.6E+0	2.9E+0	7.2E+0	3.6E+0
Indoor 24h mean	9.0E-1	1.0E+0	6.7E-1	2.6E-1	7.0E-1	2.8E-1
Indoor 24 SD	4.5E-1	6.6E-1	2.8E-1	1.1E-1	3.8E-1	2.0E-1
24h mean In/Out	0.06	0.06	0.06	0.07	0.06	0.00
Highest 8h Outdoor	1.9E+1	3.1E+1	1.7E+1	6.5E+0	1.9E+1	8.8E+0
Highest 8h Indoor	1.3E+0	1.9E+0	1.0E+0	3.7E-1	1.1E+0	5.3E-1
Highest 8 h In/Out	0.07	0.06	0.06	0.06	0.06	0.00
Highest 1h Outdoor	2.9E+1	4.2E+1	1.9E+1	1.1E+1	2.5E+1	1.2E+1
Highest 1 h Indoor ²	1.3E+0	1.9E+0	1.0E+0	3.7E-1	1.4E+0	6.7E-1
Highest 1h In/Out	0.05	0.06	0.06	0.05	0.05	0.00
Time of highest 1h Outdoor	12/12/14 22:12	12/13/14 23:42	12/14/14 23:59	12/15/14 18:59		
Corresponding highest 1h Indoor	12/12/14 23:03	12/14/14 0:17	12/15/14 0:36	12/15/14 19:27		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/12/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-10-PM-12. Summary statistics for concentrations of PM_{2.5} ($\mu\text{g m}^{-3}$) and indoor /outdoor ratios from measurements reported by TSI DustTrak II.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	3.4E-2	3.6E-2	2.6E-2	5.4E-3	2.6E-2	1.2E-2
Outdoor 24 SD	2.4E-2	2.4E-2	1.8E-2	3.9E-3	1.7E-2	8.1E-3
Indoor 24h mean	1.8E-3	2.0E-3	1.6E-3	1.1E-3	1.6E-3	3.5E-4
Indoor 24 SD	1.7E-3	2.8E-3	1.6E-3	2.1E-4	1.6E-3	9.2E-4
24h mean In/Out	0.10	0.05	0.05	0.11	0.08	0.03
Highest 8h Outdoor	5.2E-2	6.2E-2	4.5E-2	8.9E-3	4.2E-2	2.0E-2
Highest 8h Indoor	1.9E-3	3.8E-3	2.5E-3	1.2E-3	2.3E-3	9.7E-4
Highest 8 h In/Out	0.04	0.06	0.06	0.13	0.07	0.04
Highest 1h Outdoor	8.2E-2	9.8E-2	5.8E-2	1.4E-2	6.3E-2	3.2E-2
Highest 1 h Indoor ²	1.9E-3	3.8E-3	2.5E-3	1.2E-3	4.8E-3	3.3E-3
Highest 1h In/Out	0.03	0.10	0.10	0.07	0.08	0.03
Time of highest 1h Outdoor	12/13/14 8:19	12/13/14 23:39	12/14/14 21:33	12/15/14 18:04		
Corresponding highest 1h Indoor	12/13/14 8:24	12/14/14 0:31	12/15/14 0:44	12/15/14 18:04		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/12/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-10-PM-13. Daily¹ summary statistics for concentrations (nanograms m^{-3}) and indoor /outdoor ratios of aerosol black carbon measured using the Aethalometer AE22.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	8.4E+2	9.4E+2	4.5E+2	1.8E+2	6.0E+2	3.0E+2
Outdoor 24 SD	5.7E+2	1.0E+3	2.9E+2	3.1E+2	5.4E+2	2.9E+2
Indoor 24h mean	1.3E+2	2.0E+2	1.1E+2	9.6E+1	1.4E+2	4.2E+1
Indoor 24 SD	1.0E+2	1.9E+2	7.5E+1	1.0E+2	1.2E+2	4.5E+1
24h mean In/Out	0.17	0.19	0.24	0.33	0.23	0.06
Highest 8h Outdoor	1.3E+3	2.1E+3	7.8E+2	3.0E+2	1.1E+3	6.7E+2
Highest 8h Indoor	2.1E+2	3.9E+2	1.4E+2	1.3E+2	2.2E+2	1.0E+2
Highest 8 h In/Out	0.16	0.18	0.18	0.42	0.23	0.11
Highest 1h Outdoor	2.5E+3	3.4E+3	9.9E+2	8.9E+2	1.9E+3	1.1E+3
Highest 1 h Indoor ²	2.1E+2	3.9E+2	1.4E+2	1.3E+2	3.2E+2	1.4E+2
Highest 1h In/Out	0.12	0.16	0.19	0.25	0.18	0.04
Time of highest 1h Outdoor	12/12/14 22:06	12/13/14 23:45	12/14/14 23:54	12/15/14 18:33		
Corresponding highest 1h Indoor	12/12/14 23:24	12/14/14 0:21	12/15/14 0:18	12/15/14 18:33		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/12/2014 18:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Appendix FW-11-EX. Results for System E (filter taped), December 16-19, 2014.

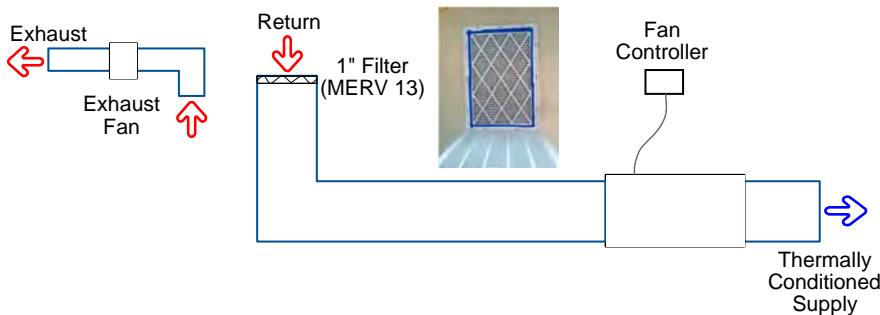


Table FW-11-EX-1. Description of **System E (filter taped)** component during the period of **December 16-19, 2014**

System Parameter	Description or Measured Value
Heating	75,000 BTU/h, 80% eff., gas furnace, 1-stage burner
Cooling	3 ton, SEER13 air conditioner
Thermal distribution	Central fan with PSC motor: 1142 cfm for cooling, 1032 cfm for heating
Ventilation	Exhaust fan in main bathroom with ECM; Set to 38 cfm continuous
Filtration	MERV13, 1" (AirGaurd DPgreen13) filter installed at return air ceiling grill of forced air furnace. Some particle removal as air infiltrates through building envelope to replace air exiting home through continuous exhaust fan in bathroom.
Recirculation blower schedule	As required for thermal conditioning, with fan cycler providing a minimum of 20 minutes per hour.
VOC removal system	None

Notes about this monitoring period

We operated with a single DustTrak throughout the operational period. All of the other instruments were functioning normally.

The 24 h running statistics in the figures starts at 12/16/2014 20:00.

It rained on 12/17/2014.

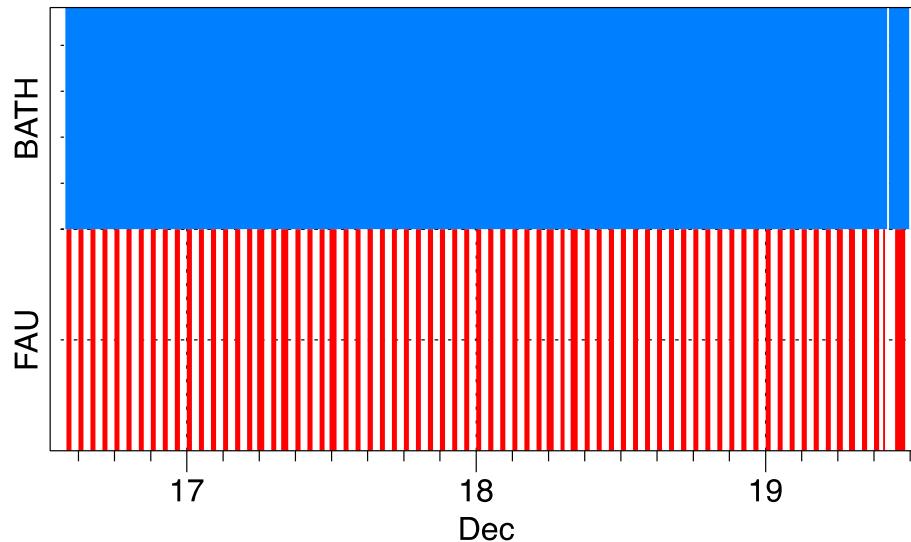


Figure FW-11-EX-1. Operation of mechanical systems: Bath exhaust fan; fan on central forced air unit (FAU).

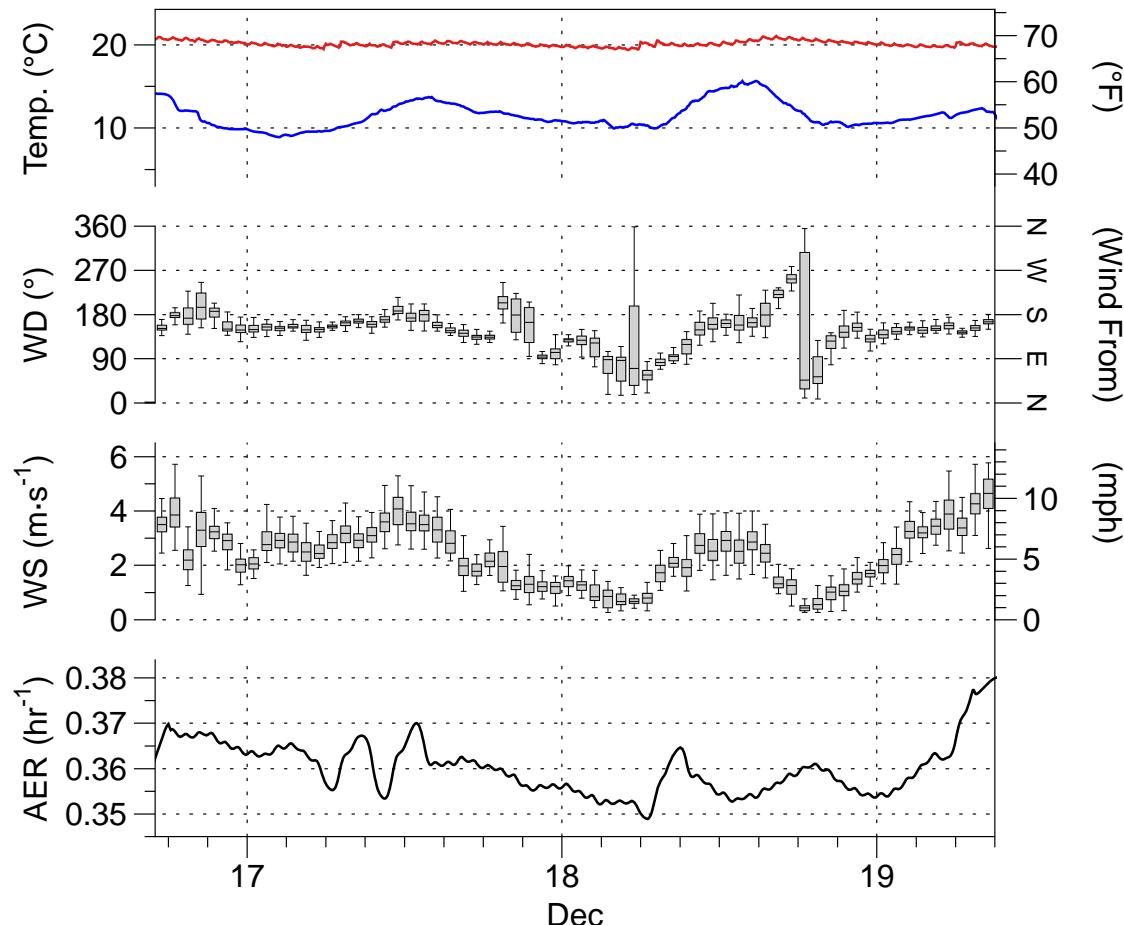


Figure FW-11-EX-2. Environmental parameters measured during operation of System E (filter taped), Dec 16-19, 2014. From top to bottom: indoor (red) and outdoor (blue) temperatures, wind direction (WD) in units of degrees from North, wind speed (WS), and air exchange rate (AER). For WD and WS, the box for each hour shows the 25th, 50th and 75th percentiles of the measured values and whiskers extend 1.5X the interquartile range (75th–25th percentile values) above the 75th and below the 25th percentile values.

Guide to plots of pollutant concentration time series and indoor / outdoor (I/O) ratios

The bottom section of each plot shows outdoor and indoor time series using the resolution of data collection: 3-min for black carbon and 1-min for all other parameters. The top and bottom of grey band are LOESS-smoothed, 1-min (or 3-min for black carbon) time-series. Also shown are time series with 1h and 24h time averaging for most pollutants. Triangles in bottom of plot indicate the highest 1h outdoor and corresponding highest 1h indoor average during each day. The top section of each plot shows the ratio of indoor to outdoor running 24h mean values (8h for ozone) and the ratios of highest 1h indoor to corresponding highest 1h outdoor concentration each day.

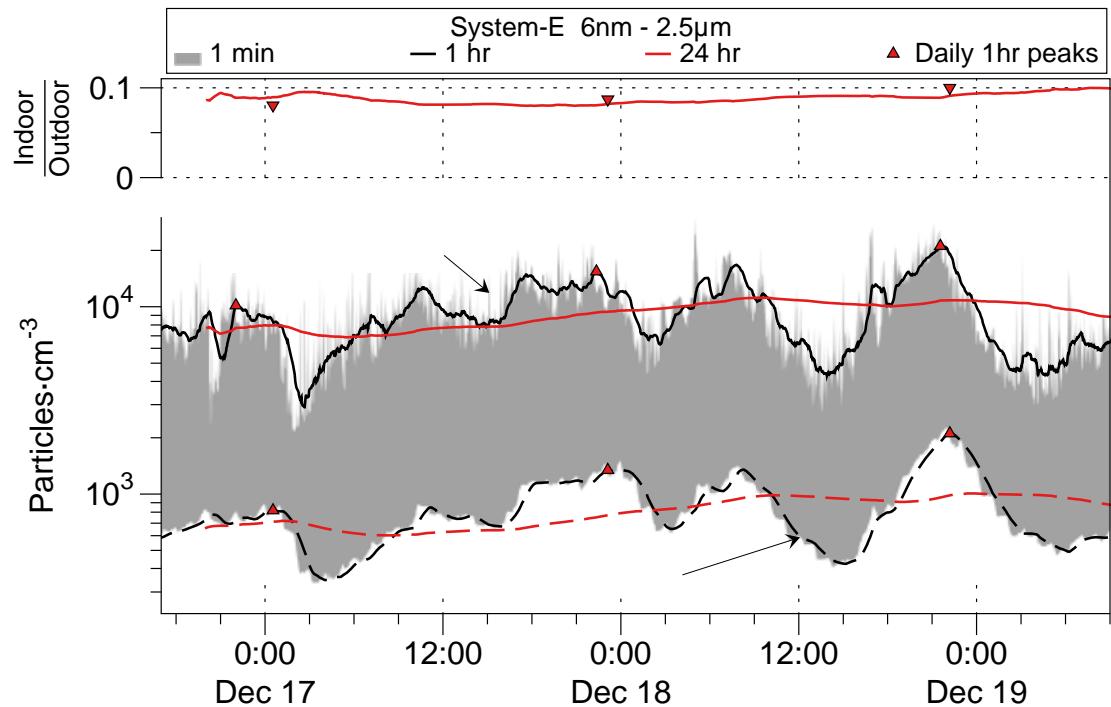


Figure FW-11-EX-3. Number concentrations of 6 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of System E (filter taped), Dec 16-19, 2014. Data collected using TSI 3787 CPCs.

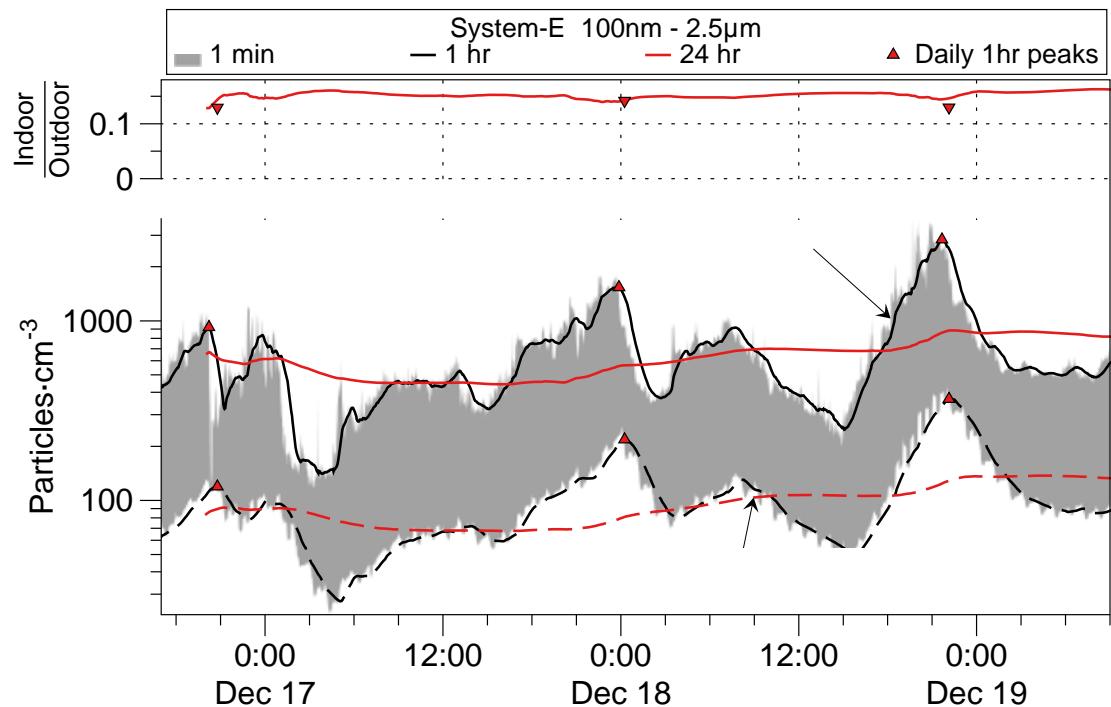


Figure FW-11-EX-4. Number concentrations of 100 nm to 2.5 μm diameter particles measured outdoors and indoors during operation of System E (filter taped), Dec 16-19, 2014. Data collected using TSI 3781 CPCs outfitted with screens to exclude particles smaller than 100 nm. Refer to “Guide” before Figure FW-11-EX-3.

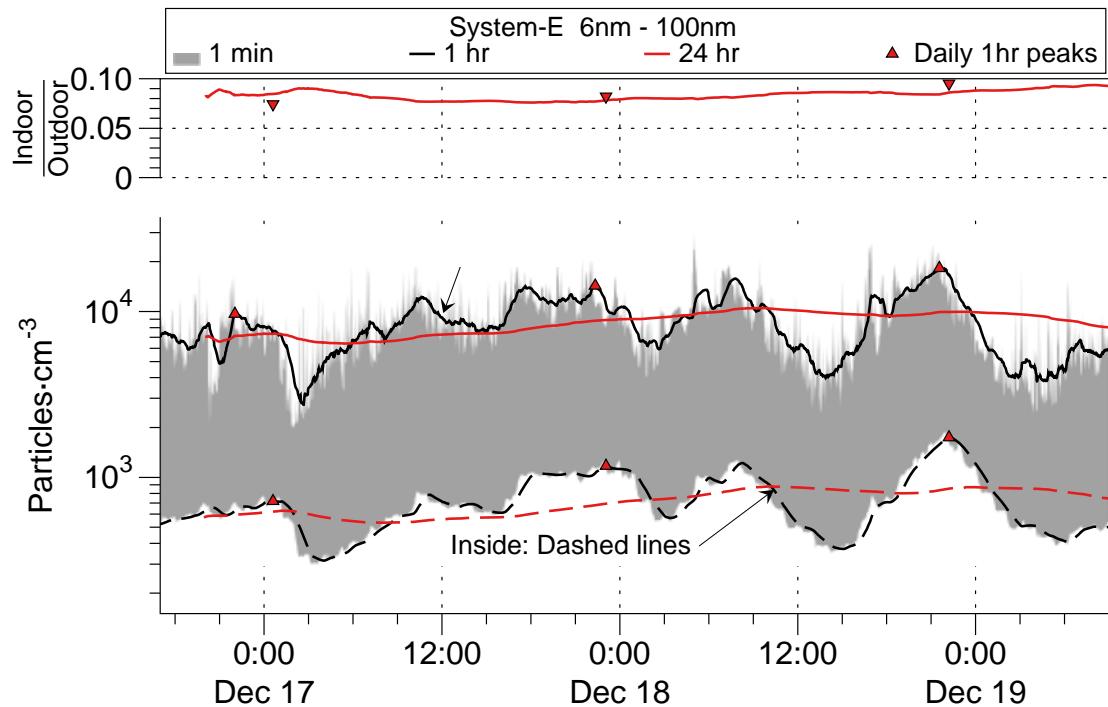


Figure FW-11-EX-5. Number concentrations of 6–100 nm diameter particles measured outdoors and indoors during operation of System E (filter taped), Dec 16-19, 2014. Data obtained as the difference between time series shown in prior two figures. Refer to “Guide” before Figure FW-11-EX-3.

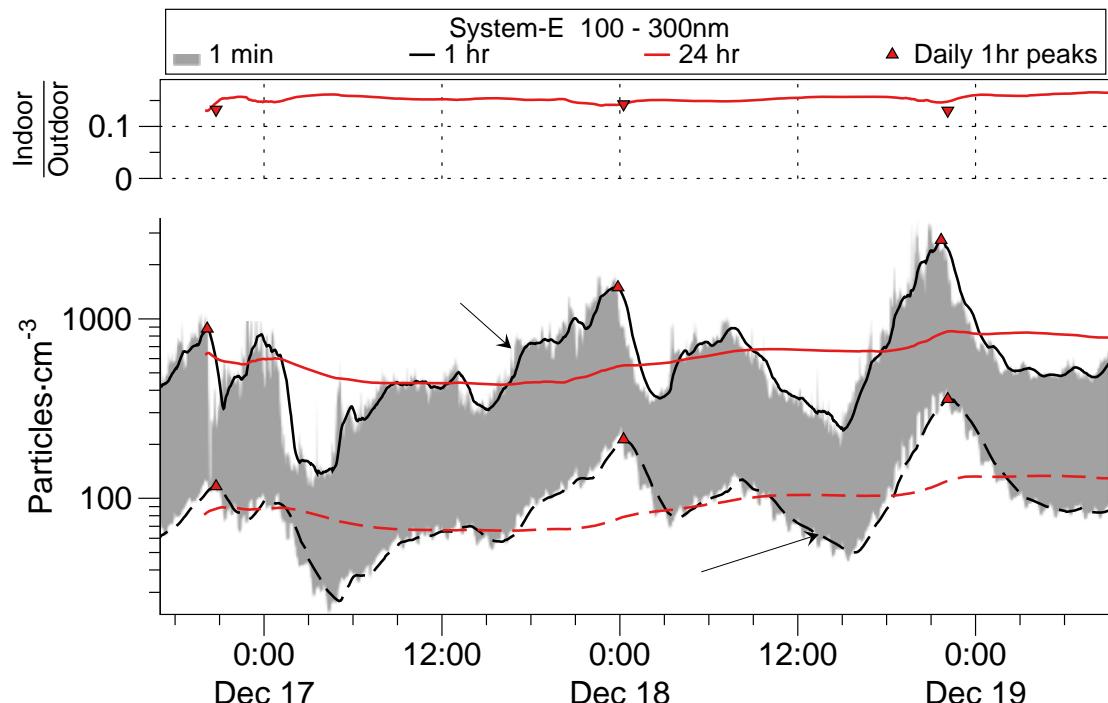


Figure FW-11-EX-6. Number concentrations of 100–300 nm diameter particles measured outdoors and indoors during operation of System E (filter taped), Dec 16-19, 2014. Data obtained as the difference between the TSI 3781 CPC with size selector and the MetOne BT637S OPC. Refer to “Guide” before Figure FW-11-EX-3.

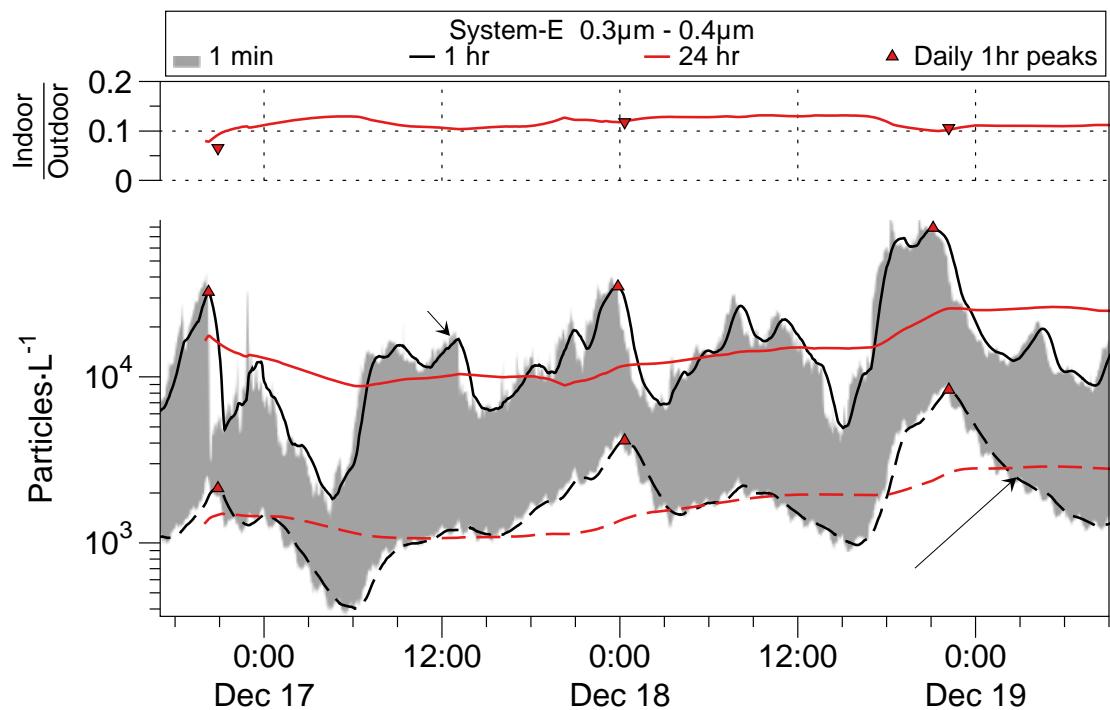


Figure FW-11-EX-7. Number concentrations of 0.3–0.4 μm diameter particles measured outdoors and indoors during operation of System E (filter taped), Dec 16-19, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-11-EX-3.

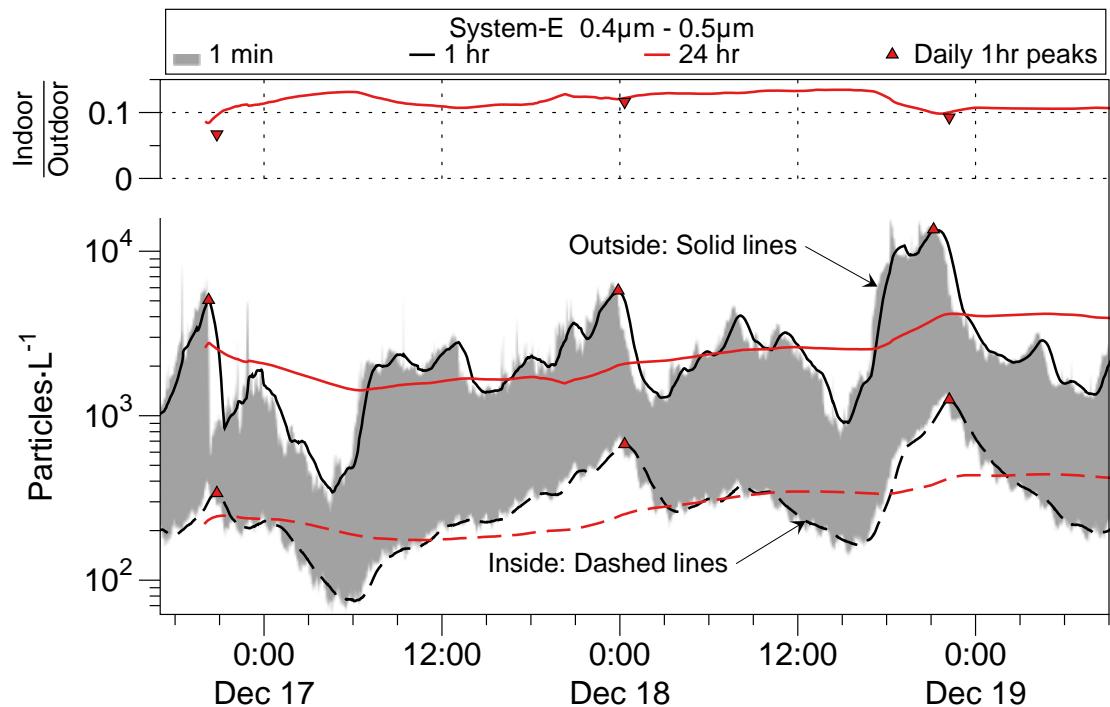


Figure FW-11-EX-8. Number concentrations of 0.4–0.5 μm diameter particles measured outdoors and indoors during operation of System E (filter taped), Dec 16-19, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-11-EX-3.

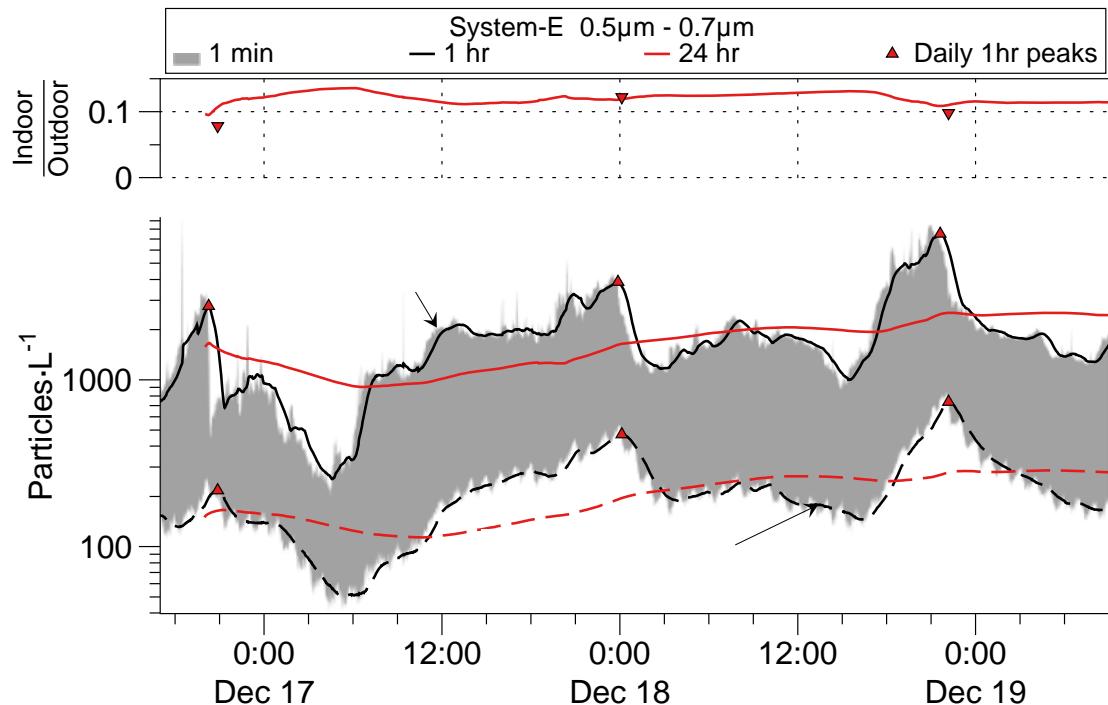


Figure FW-11-EX-9. Number concentrations of 0.5–0.7 μm diameter particles measured outdoors and indoors during operation of System E (filter taped), Dec 16-19, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-11-EX-3.

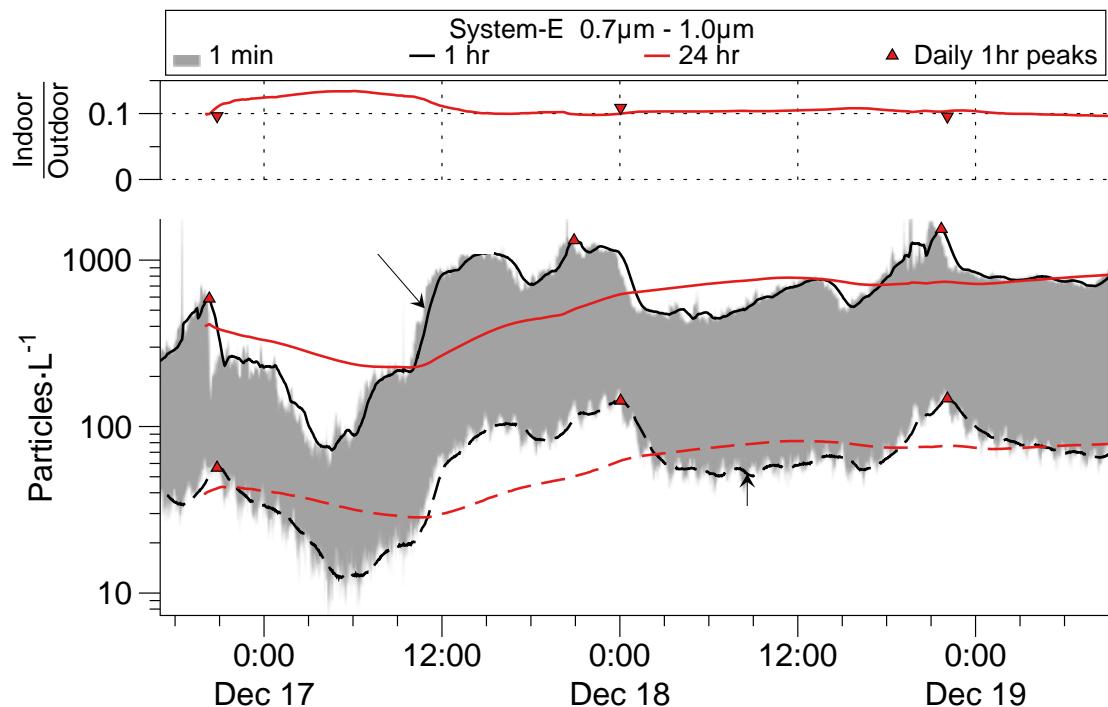


Figure FW-11-EX-10. Number concentrations of 0.7–1.0 μm diameter particles measured outdoors and indoors during operation of System E (filter taped), Dec 16-19, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-11-EX-3.

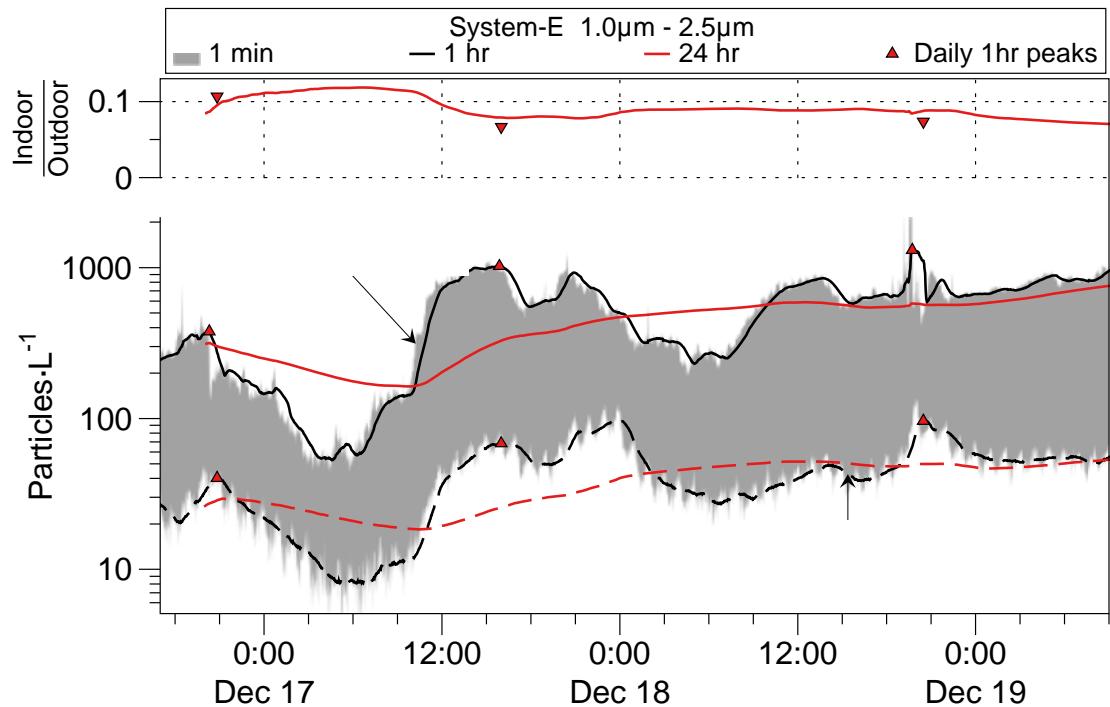


Figure FW-11-EX-11. Number concentrations of 1.0–2.5 μm diameter particles measured outdoors and indoors during operation of System E (filter taped), Dec 16-19, 2014. Data collected using MetOne BT637S particle counters. Refer to Figure FW-11-EX-3 for details.

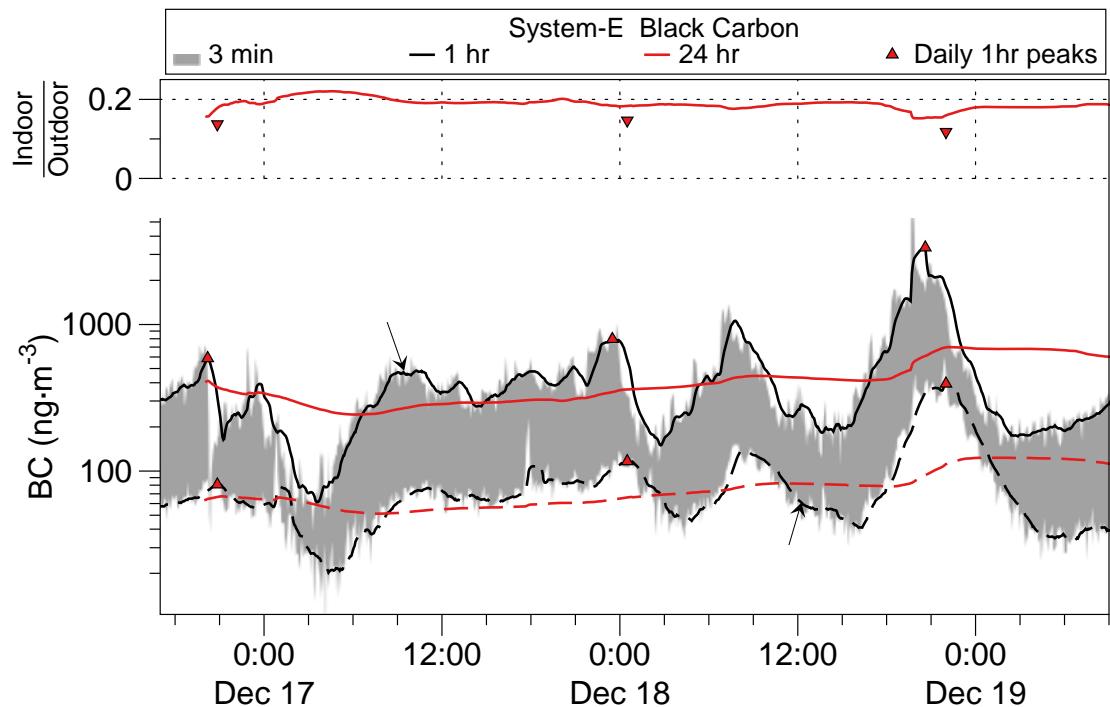


Figure FW-11-EX-12. Black carbon concentrations measured outdoors and indoors during operation of System E (filter taped), Dec 16-19, 2014. Data collected using AE22 Aethalometers with 3-min samples. Data otherwise as described in Figure FW-11-EX-3 caption.

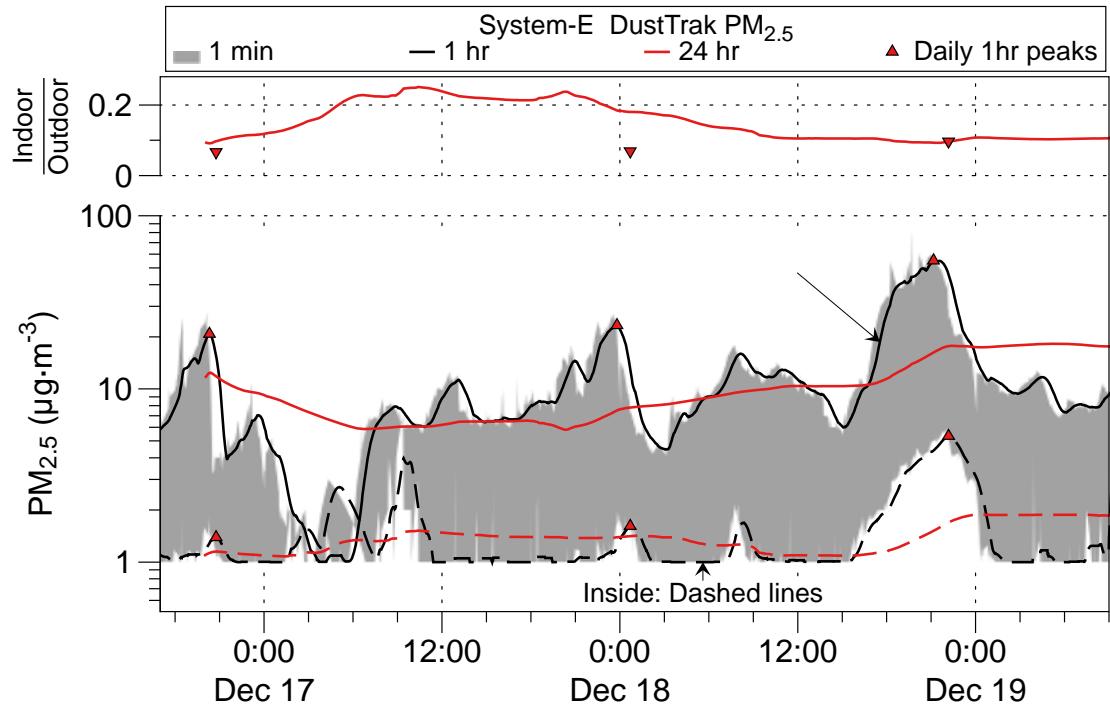


Figure FW-11-EX-13. PM_{2.5} reported by TSI DustTrak II 8530 measurements outdoors and indoors during operation of System E (filter taped), Dec 16-19, 2014. The DustTrak measures light scattering and uses a calibration to estimate PM_{2.5} mass. Refer to “Guide” before Figure FW-11-EX-3.

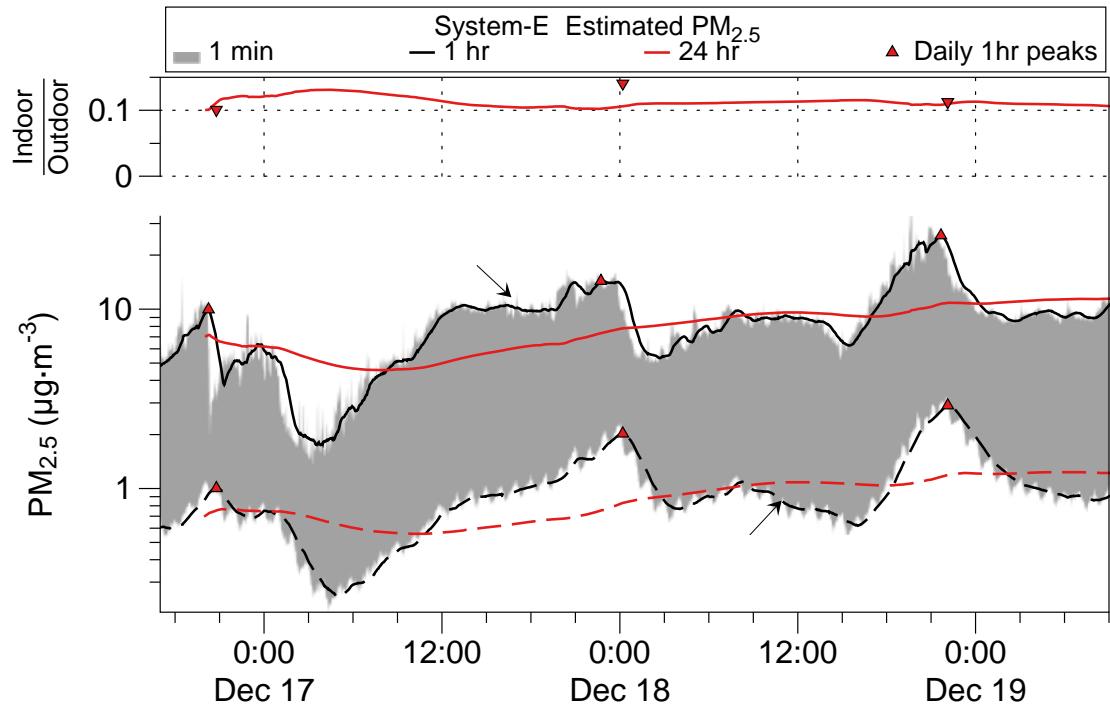


Figure FW-11-EX-14. Estimated PM_{2.5} concentration calculated from size-resolved particle number concentrations measured by MetOne and CPC during operation of System E (filter taped), Dec 16-19, 2014. Details provided in body of report. Refer to “Guide” before Figure FW-11-EX-3.

Table FW-11-EX-2. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6 nm to 2.5 micron measured using the TSI 3787 CPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Mean ¹	SD ¹
Outdoor 24h mean	6.9E+3	1.0E+4	9.7E+3	9.0E+3	1.5E+3
Outdoor 24 SD	2.7E+3	3.3E+3	5.4E+3	3.8E+3	1.2E+3
Indoor 24h mean	6.2E+2	8.9E+2	9.5E+2	8.2E+2	1.5E+2
Indoor 24 SD	1.6E+2	2.6E+2	4.7E+2	3.0E+2	1.3E+2
24h mean In/Out	0.09	0.08	0.09	0.09	0.00
Highest 8h Outdoor	8.0E+3	1.3E+4	1.4E+4	1.2E+4	2.8E+3
Highest 8h Indoor	7.4E+2	1.2E+3	1.4E+3	1.1E+3	2.9E+2
Highest 8 h In/Out	0.09	0.09	0.10	0.09	0.00
Highest 1h Outdoor	1.0E+4	1.5E+4	2.1E+4	1.6E+4	4.5E+3
Highest 1 h Indoor ²	7.4E+2	1.2E+3	1.4E+3	1.4E+3	5.3E+2
Highest 1h In/Out	0.08	0.09	0.10	0.09	0.01
Time of highest 1h Outdoor	12/16/14 22:02	12/17/14 22:21	12/18/14 21:33		
Corresponding highest 1h Indoor	12/17/14 0:32	12/17/14 23:07	12/18/14 22:11		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 12/16/2014 20:00, and has < 24h of data.² Occurring within 4h of highest 1h outdoor concentration.

Table FW-11-EX-3. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100 nm to 2.5 micron measured using the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Mean ¹	SD ¹
Outdoor 24h mean	4.7E+2	6.4E+2	8.5E+2	6.5E+2	1.6E+2
Outdoor 24 SD	2.7E+2	3.3E+2	6.6E+2	4.2E+2	1.7E+2
Indoor 24h mean	7.4E+1	9.5E+1	1.4E+2	1.0E+2	2.6E+1
Indoor 24 SD	2.8E+1	4.5E+1	8.7E+1	5.4E+1	2.5E+1
24h mean In/Out	0.15	0.15	0.15	0.15	0.00
Highest 8h Outdoor	6.7E+2	1.0E+3	1.5E+3	1.1E+3	3.5E+2
Highest 8h Indoor	9.1E+1	1.5E+2	2.4E+2	1.6E+2	5.9E+1
Highest 8 h In/Out	0.14	0.15	0.15	0.15	0.01
Highest 1h Outdoor	9.2E+2	1.5E+3	2.8E+3	1.8E+3	8.0E+2
Highest 1 h Indoor ²	9.1E+1	1.5E+2	2.4E+2	2.4E+2	1.0E+2
Highest 1h In/Out	0.13	0.14	0.13	0.13	0.01
Time of highest 1h Outdoor	12/16/14 20:13	12/17/14 23:52	12/18/14 21:39		
Corresponding highest 1h Indoor	12/16/14 20:47	12/18/14 0:15	12/18/14 22:08		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 12/16/2014 20:00, and has < 24h of data.² Occurring within 4h of highest 1h outdoor concentration.

Table FW-11-EX-4. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6–100 nm based on difference between concentrations measured using the TSI 3787 CPC and the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Mean ¹	SD ¹
Outdoor 24h mean	6.5E+3	9.9E+3	8.9E+3	8.4E+3	1.4E+3
Outdoor 24 SD	2.5E+3	3.2E+3	4.9E+3	3.5E+3	9.9E+2
Indoor 24h mean	5.4E+2	7.9E+2	8.2E+2	7.2E+2	1.2E+2
Indoor 24 SD	1.4E+2	2.2E+2	3.9E+2	2.5E+2	1.1E+2
24h mean In/Out	0.08	0.08	0.09	0.08	0.00
Highest 8h Outdoor	7.4E+3	1.2E+4	1.3E+4	1.1E+4	2.4E+3
Highest 8h Indoor	5.9E+2	1.1E+3	1.2E+3	9.5E+2	2.6E+2
Highest 8 h In/Out	0.08	0.09	0.09	0.09	0.01
Highest 1h Outdoor	9.7E+3	1.4E+4	1.8E+4	1.4E+4	3.5E+3
Highest 1 h Indoor ²	5.9E+2	1.1E+3	1.2E+3	1.2E+3	4.2E+2
Highest 1h In/Out	0.07	0.08	0.10	0.08	0.01
Time of highest 1h Outdoor	12/16/14 22:02	12/17/14 22:20	12/18/14 21:33		
Corresponding highest 1h Indoor	12/17/14 0:36	12/17/14 23:04	12/18/14 22:12		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 12/16/2014 20:00, and has < 24h of data.² Occurring within 4h of highest 1h outdoor concentration.

Table FW-11-EX-5. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100–300 nm based on difference between concentrations measured using the TSI 3781 CPC with size selector and the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Mean ¹	SD ¹
Outdoor 24h mean	4.6E+5	6.2E+5	8.2E+5	6.3E+5	1.5E+5
Outdoor 24 SD	2.6E+5	3.2E+5	6.4E+5	4.1E+5	1.7E+5
Indoor 24h mean	7.2E+4	9.3E+4	1.3E+5	9.9E+4	2.5E+4
Indoor 24 SD	2.8E+4	4.4E+4	8.5E+4	5.2E+4	2.4E+4
24h mean In/Out	0.15	0.15	0.16	0.15	0.00
Highest 8h Outdoor	6.5E+5	9.7E+5	1.5E+6	1.0E+6	3.3E+5
Highest 8h Indoor	8.9E+4	1.4E+5	2.3E+5	1.5E+5	5.7E+4
Highest 8 h In/Out	0.14	0.15	0.16	0.15	0.01
Highest 1h Outdoor	8.8E+5	1.5E+6	2.7E+6	1.7E+6	7.7E+5
Highest 1 h Indoor ²	8.9E+4	1.4E+5	2.3E+5	2.3E+5	9.9E+4
Highest 1h In/Out	0.13	0.14	0.13	0.14	0.01
Time of highest 1h Outdoor	12/16/14 20:10	12/17/14 23:52	12/18/14 21:40		
Corresponding highest 1h Indoor	12/16/14 20:46	12/18/14 0:15	12/18/14 22:07		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 12/16/2014 20:00, and has < 24h of data.² Occurring within 4h of highest 1h outdoor concentration.

Table FW-11-EX-6. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.3–0.4 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Mean ¹	SD ¹
Outdoor 24h mean	8.9E+3	1.3E+4	2.6E+4	1.6E+4	7.4E+3
Outdoor 24 SD	8.6E+3	6.8E+3	2.1E+4	1.2E+4	6.5E+3
Indoor 24h mean	1.2E+3	1.7E+3	2.9E+3	1.9E+3	7.2E+2
Indoor 24 SD	4.9E+2	9.0E+2	2.0E+3	1.1E+3	6.5E+2
24h mean In/Out	0.12	0.12	0.12	0.12	0.00
Highest 8h Outdoor	1.8E+4	1.8E+4	4.9E+4	2.8E+4	1.5E+4
Highest 8h Indoor	1.5E+3	2.7E+3	5.3E+3	3.2E+3	1.6E+3
Highest 8 h In/Out	0.08	0.15	0.11	0.11	0.03
Highest 1h Outdoor	3.3E+4	3.5E+4	7.9E+4	4.9E+4	2.1E+4
Highest 1 h Indoor ²	1.5E+3	2.7E+3	5.3E+3	4.9E+3	2.6E+3
Highest 1h In/Out	0.07	0.12	0.11	0.10	0.02
Time of highest 1h Outdoor	12/16/14 20:15	12/17/14 23:52	12/18/14 21:08		
Corresponding highest 1h Indoor	12/16/14 20:53	12/18/14 0:19	12/18/14 22:11		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 12/16/2014 20:00, and has < 24h of data.² Occurring within 4h of highest 1h outdoor concentration.

Table FW-11-EX-7. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.4–0.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Mean ¹	SD ¹
Outdoor 24h mean	1.4E+3	2.4E+3	4.1E+3	2.6E+3	1.1E+3
Outdoor 24 SD	1.3E+3	1.1E+3	3.5E+3	2.0E+3	1.1E+3
Indoor 24h mean	1.9E+2	3.0E+2	4.4E+2	3.1E+2	1.0E+2
Indoor 24 SD	7.4E+1	1.5E+2	2.8E+2	1.7E+2	8.7E+1
24h mean In/Out	0.13	0.12	0.12	0.12	0.00
Highest 8h Outdoor	2.8E+3	3.3E+3	7.8E+3	4.6E+3	2.3E+3
Highest 8h Indoor	2.5E+2	4.7E+2	7.6E+2	4.9E+2	2.1E+2
Highest 8 h In/Out	0.09	0.14	0.10	0.11	0.02
Highest 1h Outdoor	5.1E+3	5.8E+3	1.4E+4	8.1E+3	3.9E+3
Highest 1 h Indoor ²	2.5E+2	4.7E+2	7.6E+2	7.5E+2	3.8E+2
Highest 1h In/Out	0.07	0.12	0.09	0.09	0.02
Time of highest 1h Outdoor	12/16/14 20:16	12/17/14 23:53	12/18/14 21:09		
Corresponding highest 1h Indoor	12/16/14 20:49	12/18/14 0:19	12/18/14 22:13		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 12/16/2014 20:00, and has < 24h of data.² Occurring within 4h of highest 1h outdoor concentration.

Table FW-11-EX-8. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.5–0.7 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Mean ¹	SD ¹
Outdoor 24h mean	9.2E+2	1.9E+3	2.5E+3	1.8E+3	6.6E+2
Outdoor 24 SD	7.8E+2	7.9E+2	1.6E+3	1.1E+3	4.0E+2
Indoor 24h mean	1.2E+2	2.4E+2	2.9E+2	2.2E+2	6.7E+1
Indoor 24 SD	4.9E+1	1.1E+2	1.5E+2	1.0E+2	4.2E+1
24h mean In/Out	0.13	0.12	0.12	0.12	0.01
Highest 8h Outdoor	1.7E+3	2.7E+3	4.2E+3	2.8E+3	1.0E+3
Highest 8h Indoor	1.7E+2	3.6E+2	4.5E+2	3.3E+2	1.2E+2
Highest 8 h In/Out	0.10	0.13	0.11	0.11	0.01
Highest 1h Outdoor	2.8E+3	3.9E+3	7.5E+3	4.7E+3	2.0E+3
Highest 1 h Indoor ²	1.7E+2	3.6E+2	4.5E+2	4.8E+2	2.1E+2
Highest 1h In/Out	0.08	0.12	0.10	0.10	0.02
Time of highest 1h Outdoor	12/16/14 20:16	12/17/14 23:52	12/18/14 21:36		
Corresponding highest 1h Indoor	12/16/14 20:52	12/18/14 0:08	12/18/14 22:10		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 12/16/2014 20:00, and has < 24h of data.² Occurring within 4h of highest 1h outdoor concentration.

Table FW-11-EX-9. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.7–1.0 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Mean ¹	SD ¹
Outdoor 24h mean	2.4E+2	7.2E+2	7.8E+2	5.8E+2	2.4E+2
Outdoor 24 SD	1.7E+2	3.5E+2	2.7E+2	2.6E+2	7.5E+1
Indoor 24h mean	3.2E+1	7.4E+1	7.7E+1	6.1E+1	2.1E+1
Indoor 24 SD	1.4E+1	3.8E+1	2.6E+1	2.6E+1	1.0E+1
24h mean In/Out	0.13	0.11	0.10	0.11	0.01
Highest 8h Outdoor	4.1E+2	1.0E+3	1.0E+3	8.2E+2	2.9E+2
Highest 8h Indoor	4.3E+1	1.1E+2	1.1E+2	8.6E+1	3.0E+1
Highest 8 h In/Out	0.11	0.11	0.10	0.11	0.00
Highest 1h Outdoor	5.9E+2	1.3E+3	1.5E+3	1.1E+3	4.1E+2
Highest 1 h Indoor ²	4.3E+1	1.1E+2	1.1E+2	1.2E+2	4.2E+1
Highest 1h In/Out	0.10	0.11	0.10	0.10	0.01
Time of highest 1h Outdoor	12/16/14 20:18	12/17/14 20:55	12/18/14 21:41		
Corresponding highest 1h Indoor	12/16/14 20:50	12/18/14 0:03	12/18/14 22:05		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 12/16/2014 20:00, and has < 24h of data.² Occurring within 4h of highest 1h outdoor concentration.

Table FW-11-EX-10. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 1.0–2.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Mean ¹	SD ¹
Outdoor 24h mean	1.8E+2	5.3E+2	6.9E+2	4.6E+2	2.1E+2
Outdoor 24 SD	1.1E+2	3.0E+2	3.0E+2	2.4E+2	9.0E+1
Indoor 24h mean	2.1E+1	4.7E+1	5.0E+1	4.0E+1	1.3E+1
Indoor 24 SD	1.0E+1	2.6E+1	1.8E+1	1.8E+1	6.7E+0
24h mean In/Out	0.11	0.09	0.09	0.09	0.01
Highest 8h Outdoor	3.2E+2	8.1E+2	7.7E+2	6.3E+2	2.3E+2
Highest 8h Indoor	2.9E+1	7.1E+1	6.3E+1	5.5E+1	1.8E+1
Highest 8 h In/Out	0.09	0.09	0.08	0.09	0.00
Highest 1h Outdoor	3.8E+2	1.0E+3	1.3E+3	9.0E+2	3.9E+2
Highest 1 h Indoor ²	2.9E+1	7.1E+1	6.3E+1	6.8E+1	2.3E+1
Highest 1h In/Out	0.11	0.07	0.07	0.08	0.02
Time of highest 1h Outdoor	12/16/14 20:18	12/17/14 15:52	12/18/14 19:43		
Corresponding highest 1h Indoor	12/16/14 20:50	12/17/14 16:00	12/18/14 20:28		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 12/16/2014 20:00, and has < 24h of data.² Occurring within 4h of highest 1h outdoor concentration.

Table FW-11-EX-11. Summary statistics for estimated PM_{2.5} concentrations ($\mu\text{g m}^{-3}$) calculated from particle number concentrations resolved by size from 6 nm to 2.5 microns (as reported in Tables FW-11-EX-2 to FW-11-EX-9) and resulting indoor/outdoor ratios.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Mean ¹	SD ¹
Outdoor 24h mean	4.7E+0	8.8E+0	1.1E+1	8.3E+0	2.7E+0
Outdoor 24 SD	2.5E+0	3.1E+0	5.3E+0	3.6E+0	1.2E+0
Indoor 24h mean	6.0E-1	9.7E-1	1.2E+0	9.4E-1	2.6E-1
Indoor 24 SD	2.3E-1	4.3E-1	6.3E-1	4.3E-1	1.6E-1
24h mean In/Out	0.12	0.11	0.11	0.11	0.00
Highest 8h Outdoor	7.2E+0	1.2E+1	1.7E+1	1.2E+1	3.9E+0
Highest 8h Indoor	7.7E-1	1.5E+0	2.0E+0	1.4E+0	4.9E-1
Highest 8 h In/Out	0.11	0.12	0.12	0.12	0.01
Highest 1h Outdoor	1.0E+1	1.4E+1	2.6E+1	1.7E+1	6.7E+0
Highest 1 h Indoor ²	7.7E-1	1.5E+0	2.0E+0	2.0E+0	7.8E-1
Highest 1h In/Out	0.10	0.14	0.11	0.12	0.02
Time of highest 1h Outdoor	12/16/14 20:15	12/17/14 22:43	12/18/14 21:39		
Corresponding highest 1h Indoor	12/16/14 20:47	12/18/14 0:12	12/18/14 22:07		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 12/16/2014 20:00, and has < 24h of data.² Occurring within 4h of highest 1h outdoor concentration.

Table FW-11-EX-12. Summary statistics for concentrations of PM_{2.5} ($\mu\text{g m}^{-3}$) and indoor /outdoor ratios from measurements reported by TSI DustTrak II.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Mean ¹	SD ¹
Outdoor 24h mean	6.0E-3	8.9E-3	1.8E-2	1.1E-2	5.2E-3
Outdoor 24 SD	5.8E-3	4.6E-3	1.4E-2	8.2E-3	4.3E-3
Indoor 24h mean	1.3E-3	1.3E-3	1.9E-3	1.5E-3	2.7E-4
Indoor 24 SD	5.1E-4	7.3E-4	1.3E-3	8.6E-4	3.4E-4
24h mean In/Out	0.14	0.21	0.11	0.15	0.04
Highest 8h Outdoor	1.2E-2	1.3E-2	3.4E-2	2.0E-2	9.9E-3
Highest 8h Indoor	1.1E-3	1.1E-3	3.4E-3	1.9E-3	1.1E-3
Highest 8 h In/Out	0.09	0.09	0.10	0.09	0.01
Highest 1h Outdoor	2.1E-2	2.3E-2	5.5E-2	3.3E-2	1.6E-2
Highest 1 h Indoor ²	1.1E-3	1.1E-3	3.4E-3	2.8E-3	1.8E-3
Highest 1h In/Out	0.07	0.07	0.10	0.08	0.01
Time of highest 1h Outdoor	12/16/14 20:19	12/17/14 23:48	12/18/14 21:09		
Corresponding highest 1h Indoor	12/16/14 20:46	12/18/14 0:42	12/18/14 22:10		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 12/16/2014 20:00, and has < 24h of data.² Occurring within 4h of highest 1h outdoor concentration.

Table FW-11-EX-13. Daily¹ summary statistics for concentrations (nanograms m^{-3}) and indoor /outdoor ratios of aerosol black carbon measured using the Aethalometer AE22.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Mean ¹	SD ¹
Outdoor 24h mean	2.4E+2	3.9E+2	6.6E+2	4.3E+2	1.7E+2
Outdoor 24 SD	1.6E+2	1.6E+2	9.0E+2	4.0E+2	3.5E+2
Indoor 24h mean	5.3E+1	7.2E+1	1.2E+2	8.2E+1	2.9E+1
Indoor 24 SD	2.3E+1	2.3E+1	1.0E+2	5.1E+1	3.8E+1
24h mean In/Out	0.19	0.19	0.18	0.19	0.01
Highest 8h Outdoor	4.1E+2	5.2E+2	1.3E+3	7.5E+2	4.1E+2
Highest 8h Indoor	6.7E+1	9.5E+1	2.3E+2	1.3E+2	7.0E+1
Highest 8 h In/Out	0.16	0.18	0.17	0.17	0.01
Highest 1h Outdoor	5.9E+2	7.9E+2	3.3E+3	1.6E+3	1.3E+3
Highest 1 h Indoor ²	6.7E+1	9.5E+1	2.3E+2	2.0E+2	1.4E+2
Highest 1h In/Out	0.14	0.15	0.12	0.13	0.01
Time of highest 1h Outdoor	12/16/14 20:12	12/17/14 23:30	12/18/14 20:36		
Corresponding highest 1h Indoor	12/16/14 20:51	12/18/14 0:30	12/18/14 22:00		

¹ Based on 24h periods starting / ending at 6am. Day 1 starts at 12/16/2014 20:00, and has < 24h of data.² Occurring within 4h of highest 1h outdoor concentration.

Appendix FW-12-AX. Summary Results for System A (filter taped), December 19-23, 2014.

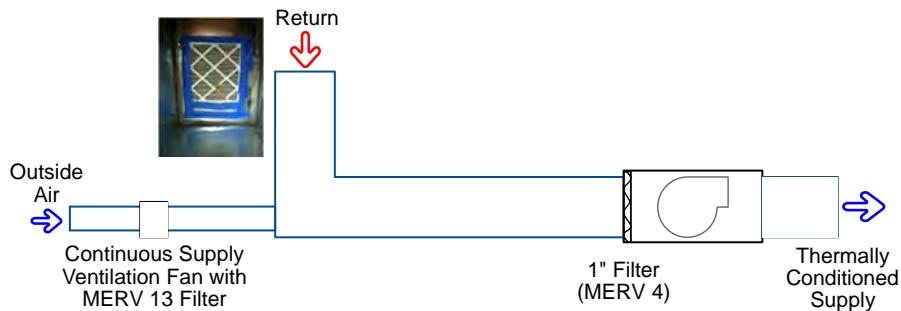


Table FW-12-AX-1. Description **System A (filter taped)** component characteristics during the period of December 19-23, 2014

System Parameter	Description or Measured Value
Heating	75,000 BTU/h, 80% eff., gas furnace, 1-stage burner
Cooling	3 ton, SEER13 air conditioner
Thermal distribution	Central fan with PSC motor: 1200 cfm for cooling, 1074 cfm for heating
Ventilation	Supply fan discharging into the return plenum. Set to 38 cfm continuous
Filtration	MERV4, 1" (Purolator F312) filter installed inside the FAU cabinet. A MERV13, 2" (AirGaurd DPgreen13) installed where the continuous supply air discharges into the return plenum.
Recirculation blower schedule	As required for thermal conditioning, no fan cycler.
VOC removal system	None

Notes about this monitoring period

There were no major instrument problems for this operational period.

The 24 h running statistics in the figures starts at 12/19/2014 19:00.

There was fog on 12/23/2014 and 12/24/2014.

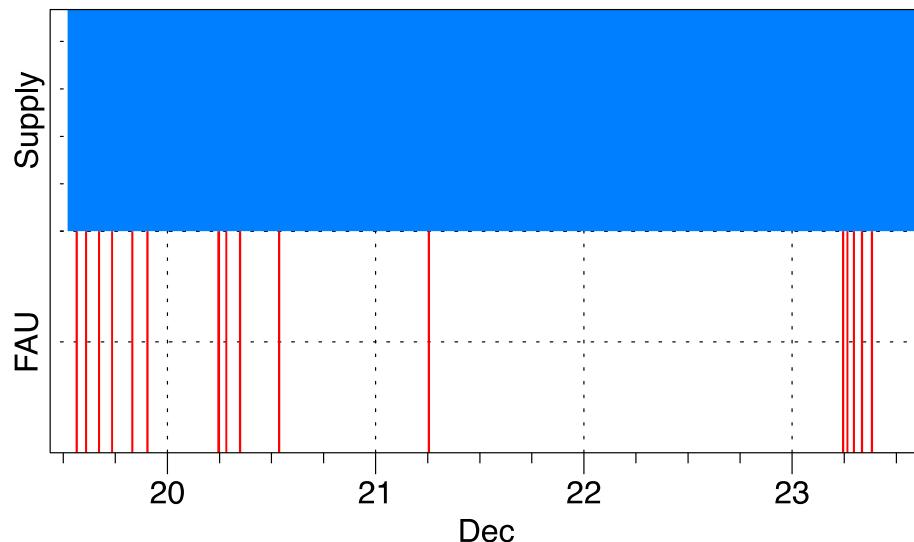


Figure FW-12-AX-1. Operation of mechanical systems: Supply fan; fan on central forced air unit (FAU).

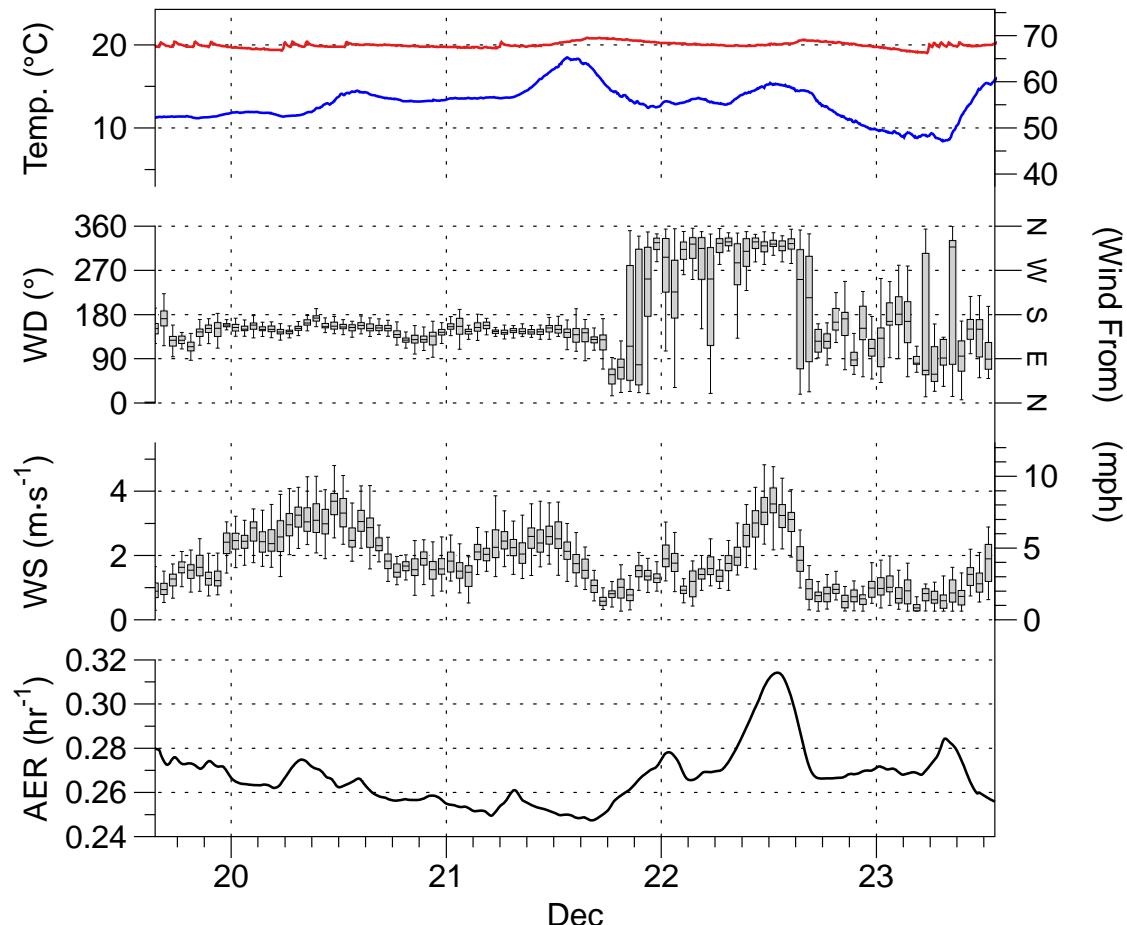


Figure FW-12-AX-2. Environmental parameters measured during operation of System A (filter taped), Dec 19-23, 2014. From top to bottom: indoor (red) and outdoor (blue) temperatures, wind direction (WD) in units of degrees from North, wind speed (WS), and air exchange rate (AER). For WD and WS, the box for each hour shows the 25th, 50th and 75th percentiles of the measured values and whiskers extend 1.5X the interquartile range (75th-25th percentile values) above the 75th and below the 25th percentile values.

Guide to plots of pollutant concentration time series and indoor / outdoor (I/O) ratios

The bottom section of each plot shows outdoor and indoor time series using the resolution of data collection: 3-min for black carbon and 1-min for all other parameters. The top and bottom of grey band are LOESS-smoothed, 1-min (or 3-min for black carbon) time-series. Also shown are time series with 1h and 24h time averaging for most pollutants. Triangles in bottom of plot indicate the highest 1h outdoor and corresponding highest 1h indoor average during each day. The top section of each plot shows the ratio of indoor to outdoor running 24h mean values (8h for ozone) and the ratios of highest 1h indoor to corresponding highest 1h outdoor concentration each day.

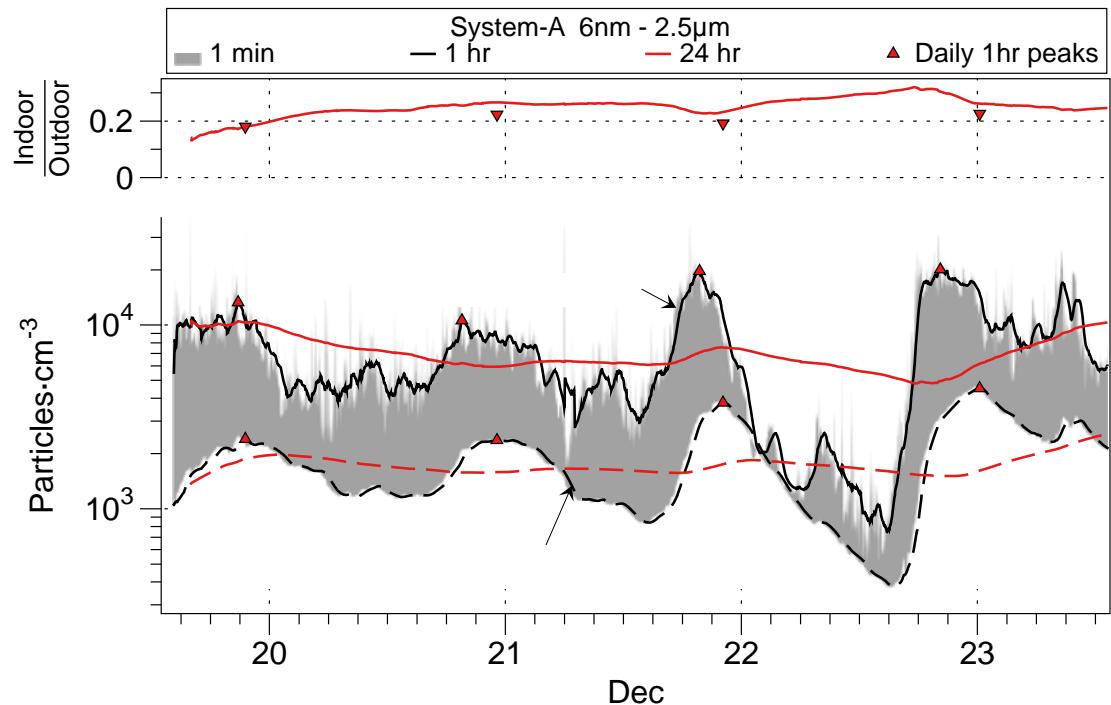


Figure FW-12-AX-3. Number concentrations of 6 nm to 2.5 μ m diameter particles measured outdoors and indoors during operation of System A (filter taped), Dec 19-23, 2014. Data collected using TSI 3787 CPCs.

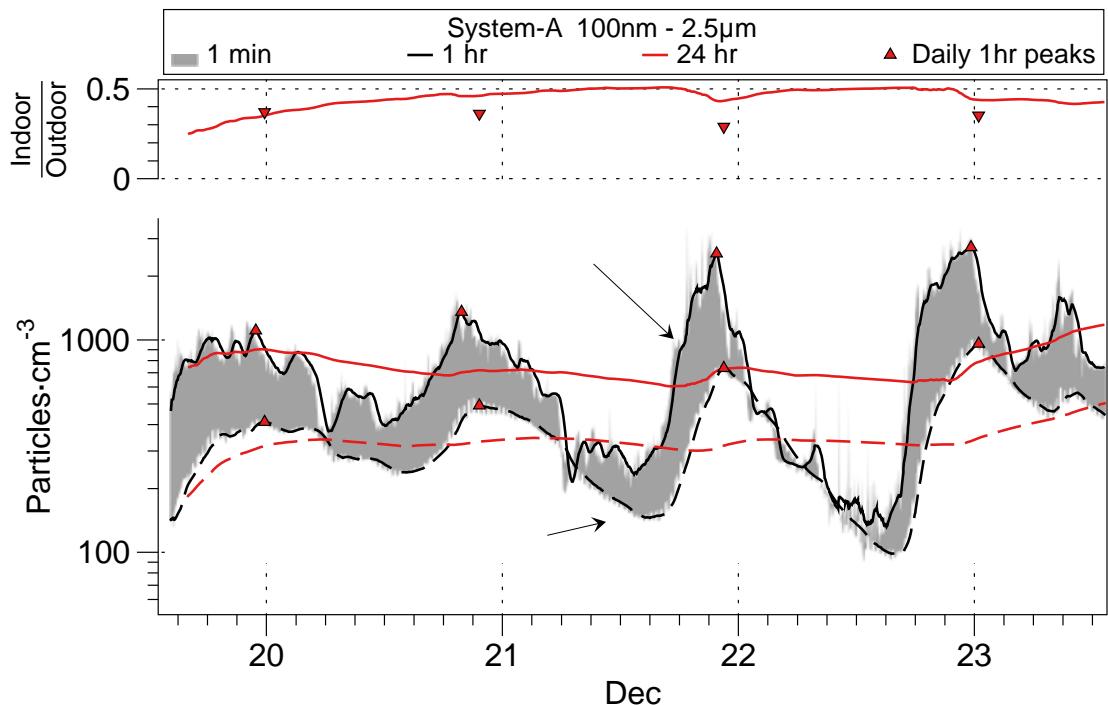


Figure FW-12-AX-4. Number concentrations of 100 nm to 2.5 μ m diameter particles measured outdoors and indoors during operation of System A (filter taped), Dec 19-23, 2014. Data collected using TSI 3781 CPCs outfitted with screens to exclude particles smaller than 100 nm. Refer to "Guide" before Figure FW-12-AX-3.

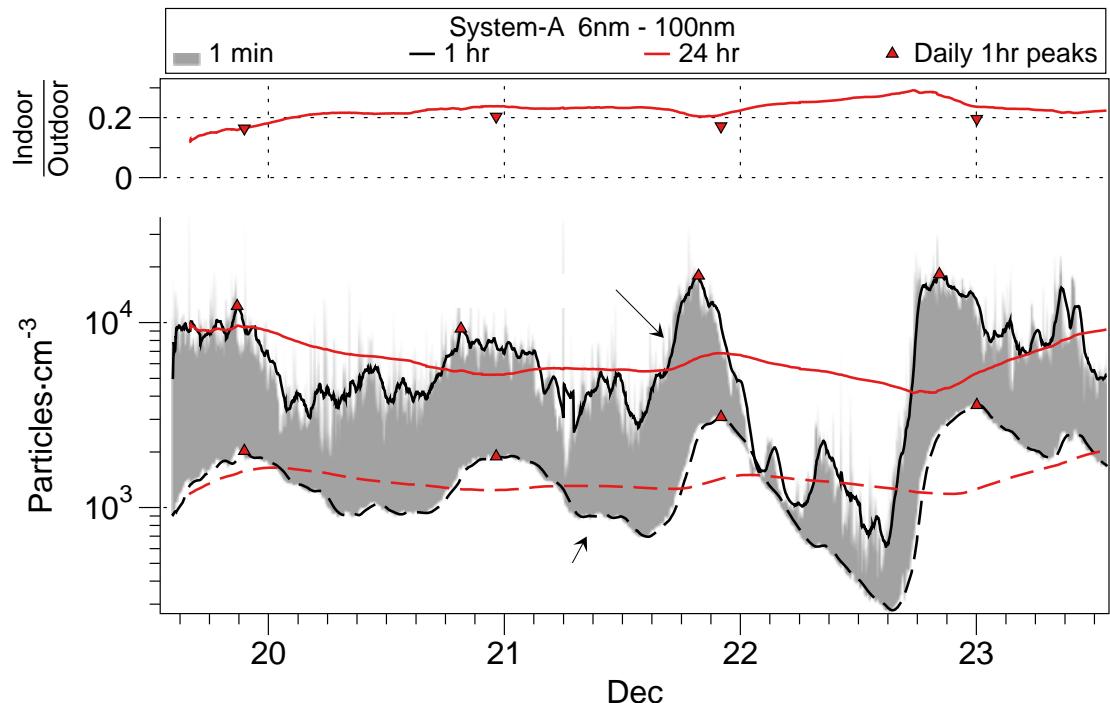


Figure FW-12-AX-5. Number concentrations of 6–100 nm diameter particles measured outdoors and indoors during operation of System A (filter taped), Dec 19-23, 2014. Data obtained as the difference between time series show in prior two figures. Refer to “Guide” before Figure FW-12-AX-3.

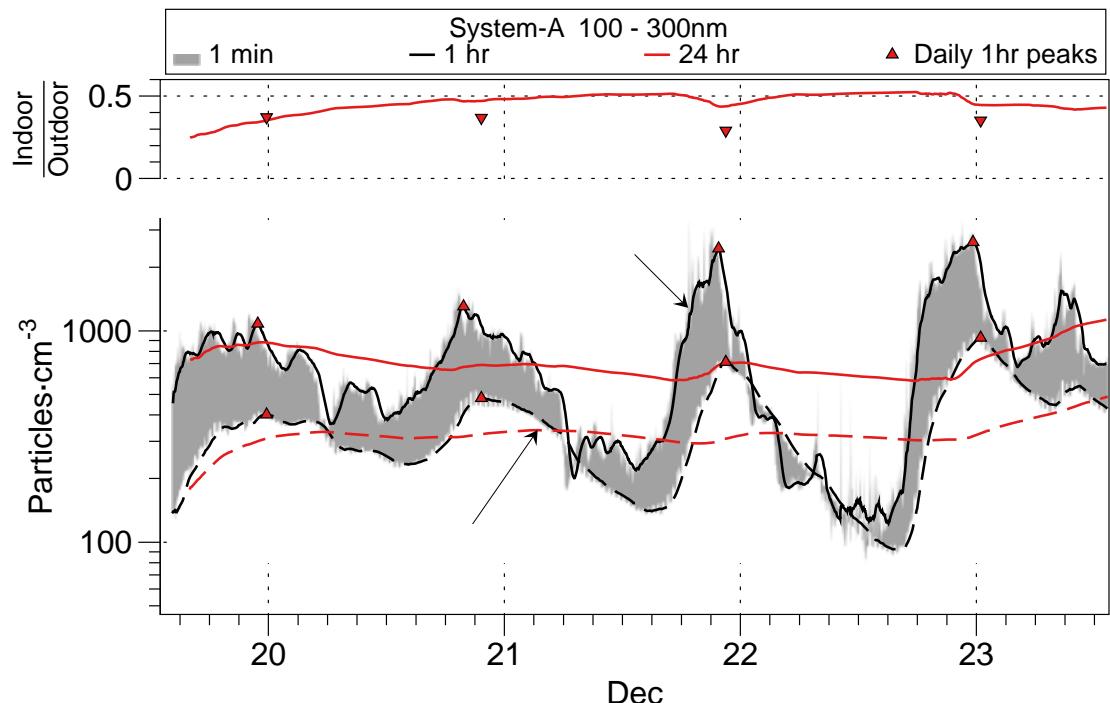


Figure FW-12-AX-6. Number concentrations of 100–300 nm diameter particles measured outdoors and indoors during operation of System A (filter taped), Dec 19-23, 2014. Data obtained as the difference between the TSI 3781 CPC with size selector and the MetOne BT637S OPC. Refer to “Guide” before Figure FW-12-AX-3

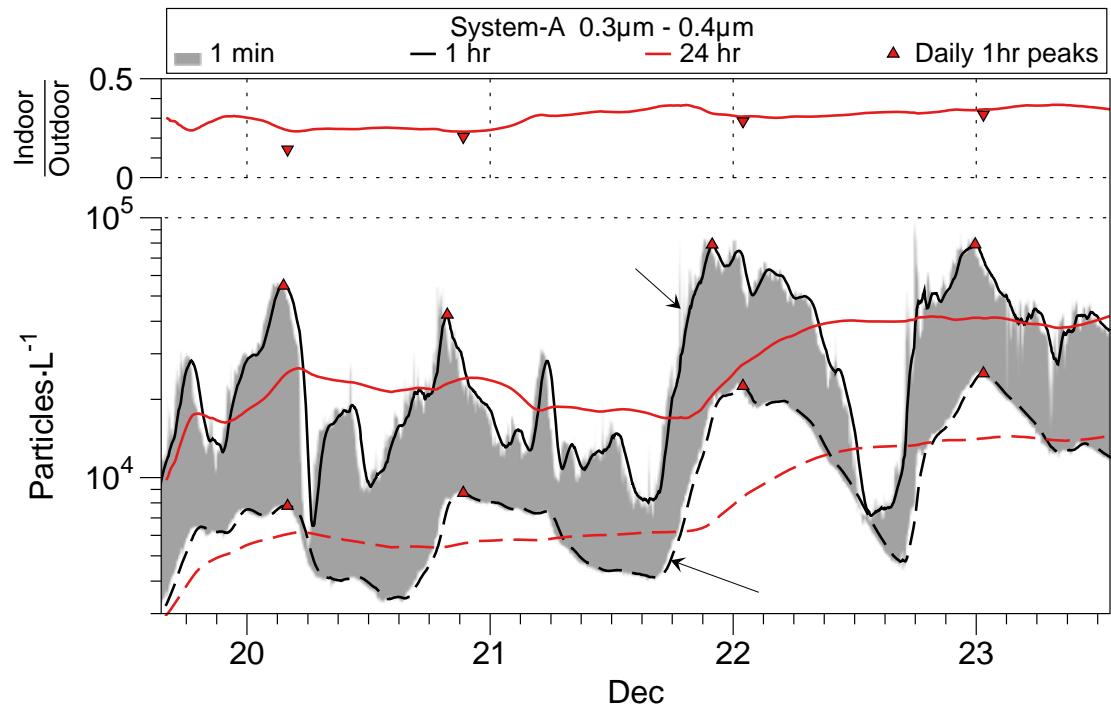


Figure FW-12-AX-7. Number concentrations of $0.3\text{--}0.4\text{ }\mu\text{m}$ diameter particles measured outdoors and indoors during operation of System A (filter taped), Dec 19-23, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-12-AX-3.

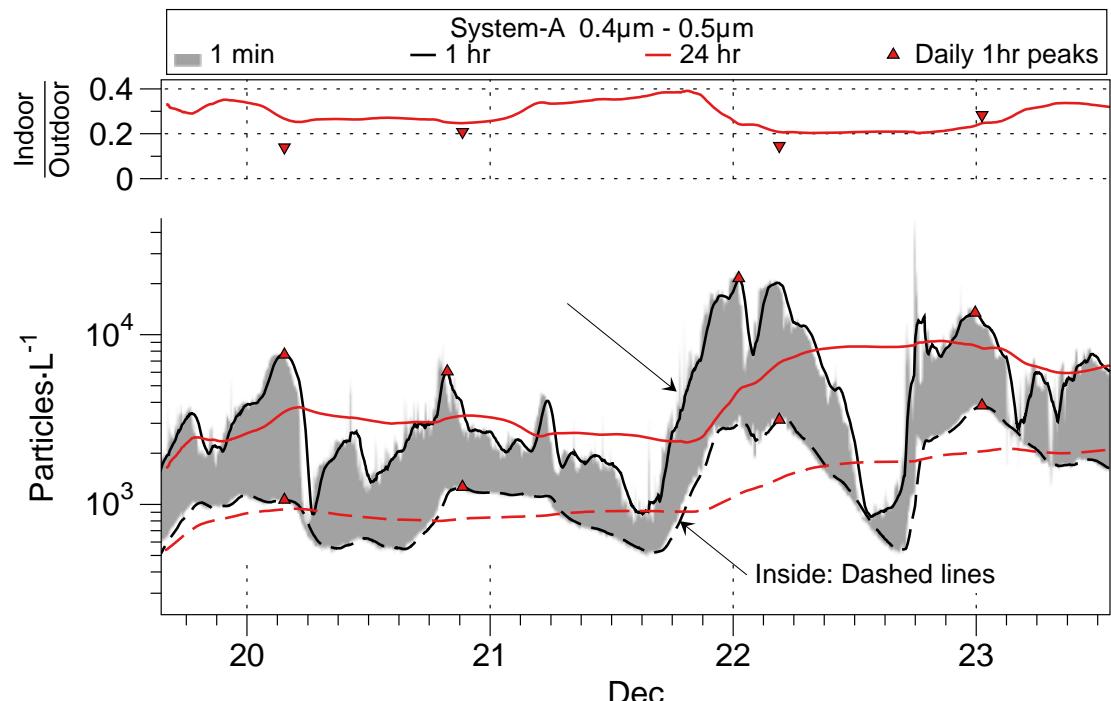


Figure FW-12-AX-8. Number concentrations of $0.4\text{--}0.5\text{ }\mu\text{m}$ diameter particles measured outdoors and indoors during operation of System A (filter taped), Dec 19-23, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-12-AX-3.

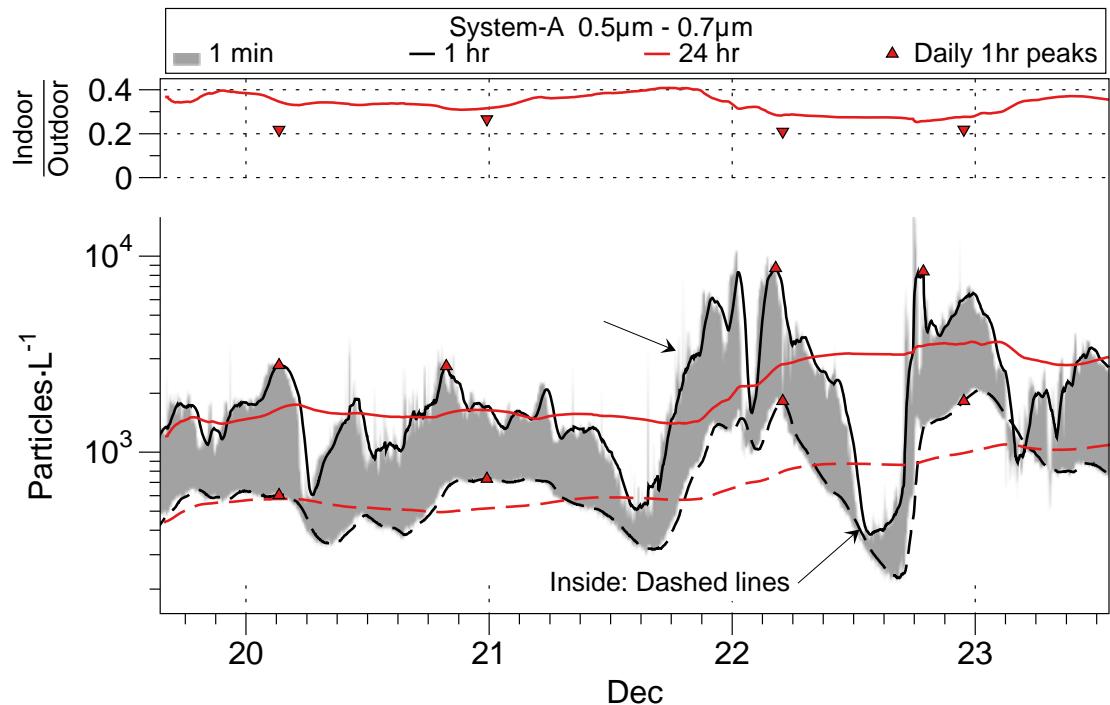


Figure FW-12-AX-9. Number concentrations of $0.5\text{--}0.7\text{ }\mu\text{m}$ diameter particles measured outdoors and indoors during operation of System A (filter taped), Dec 19-23, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-12-AX-3.

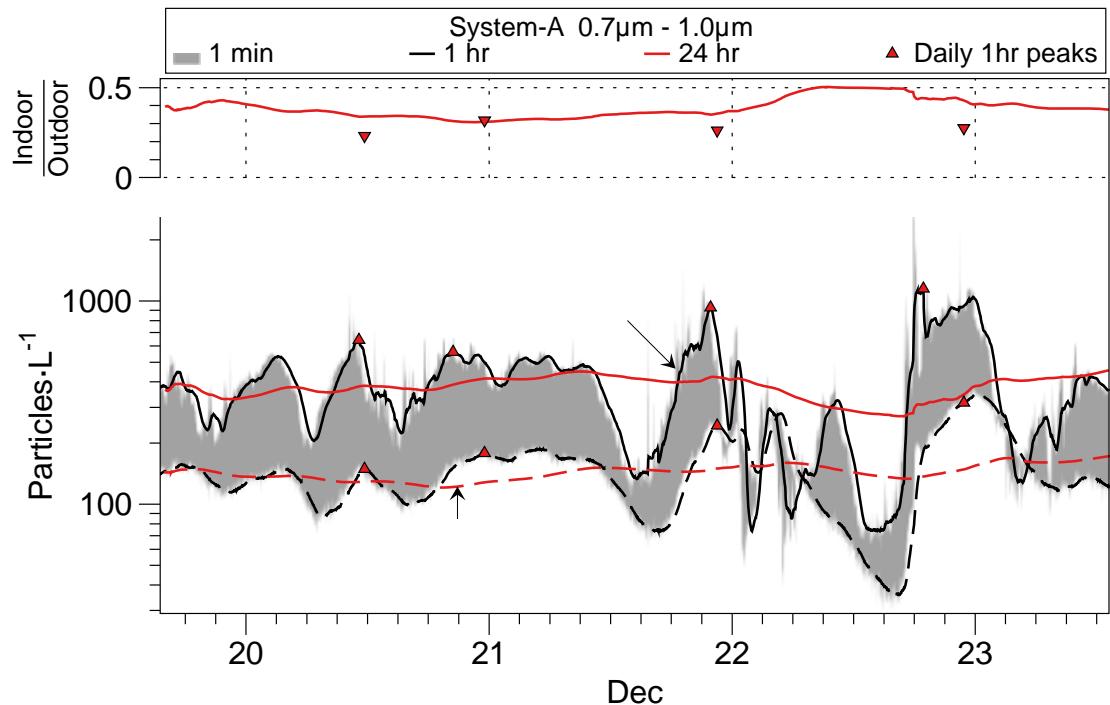


Figure FW-12-AX-10. Number concentrations of $0.7\text{--}1.0\text{ }\mu\text{m}$ diameter particles measured outdoors and indoors during operation of System A (filter taped), Dec 19-23, 2014. Data collected using MetOne BT637S particle counters. Refer to “Guide” before Figure FW-12-AX-3.

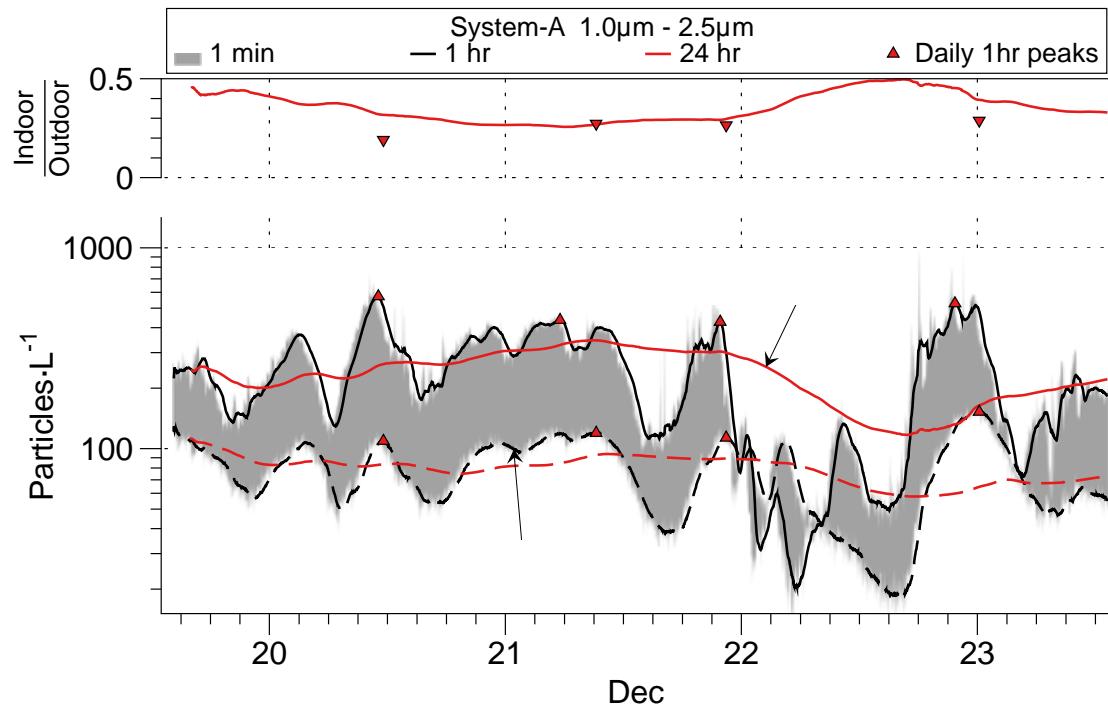


Figure FW-12-AX-11. Number concentrations of 1.0–2.5 μm diameter particles measured outdoors and indoors during operation of System A (filter taped), Dec 19-23, 2014. Data collected using MetOne BT637S particle counters. Refer to Figure FW-12-AX-3 for details.

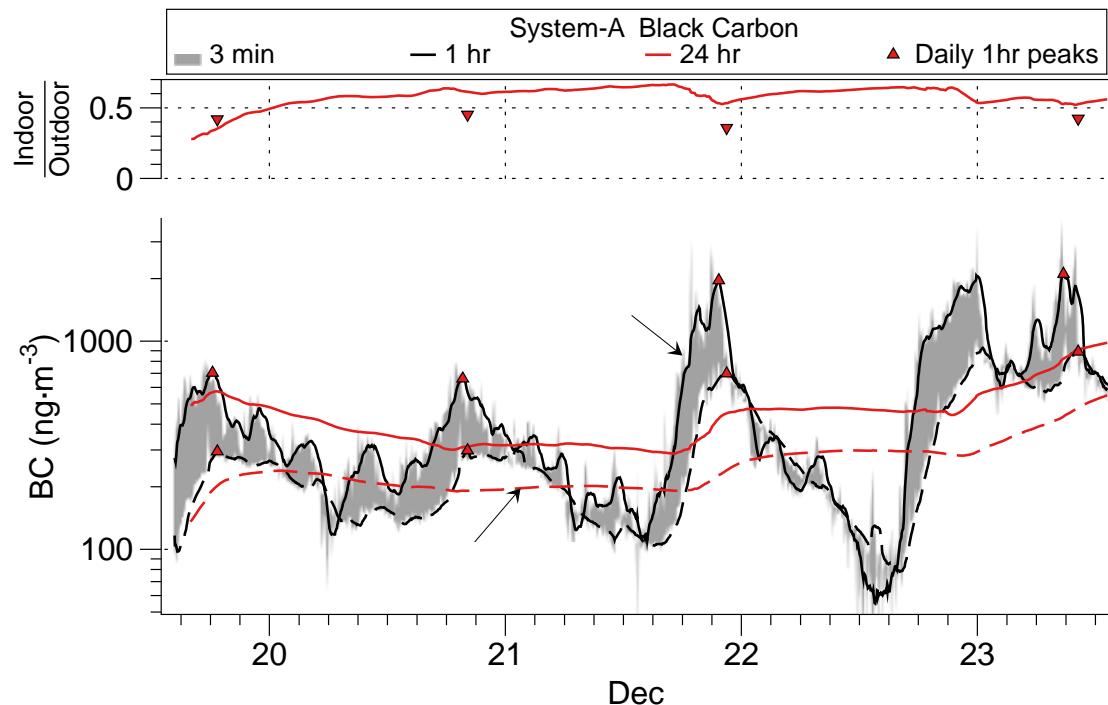


Figure FW-12-AX-12. Black carbon concentrations measured outdoors and indoors during operation of System A (filter taped), Dec 19-23, 2014. Data collected using AE22 Aethalometers with 3-min samples. Data otherwise as described in Figure FW-12-AX-3 caption.

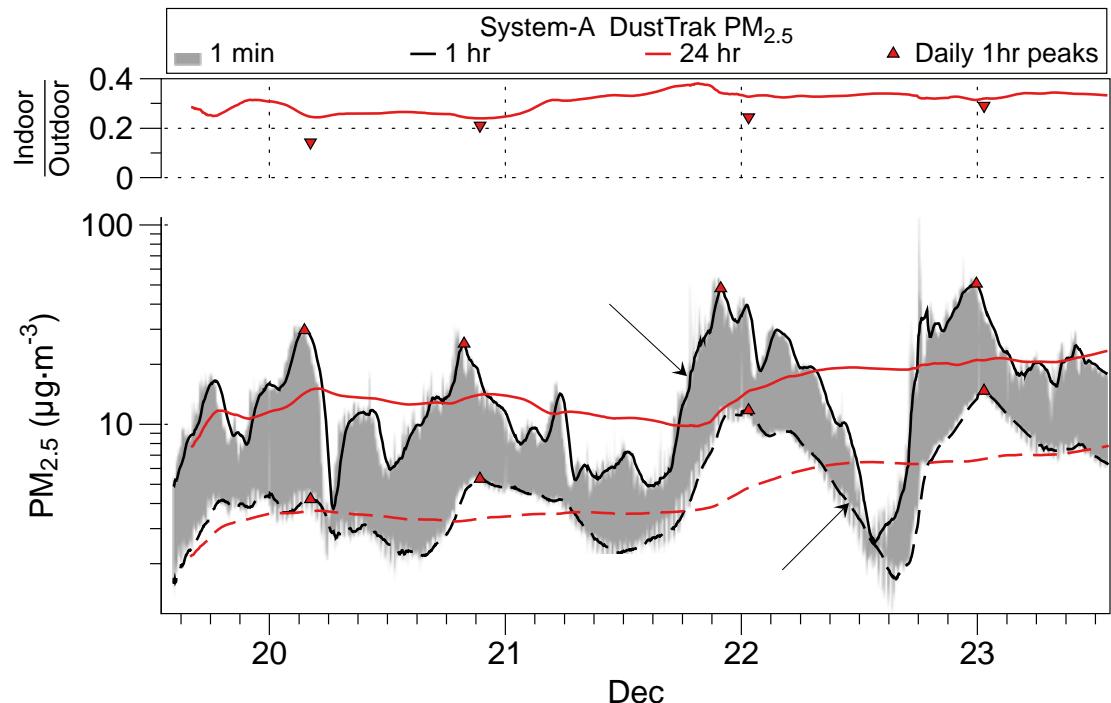


Figure FW-12-AX-13. PM_{2.5} reported by TSI DustTrak II 8530 measurements outdoors and indoors during operation of System A (filter taped), Dec 19-23, 2014. The DustTrak measures light scattering and uses a calibration to estimate PM_{2.5} mass. Refer to “Guide” before Figure FW-12-AX-3.

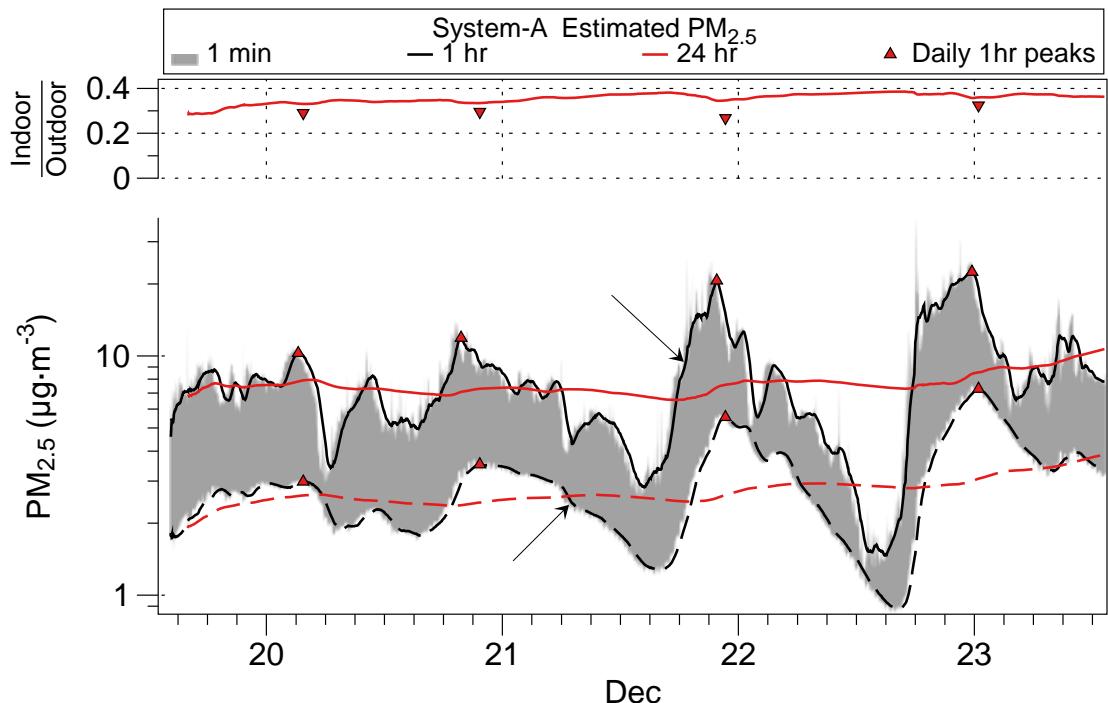


Figure FW-12-AX-14. Estimated PM_{2.5} concentration calculated from size-resolved particle number concentrations measured by MetOne and CPC during operation of System A (filter taped), Dec 19-23, 2014. Details provided in body of report. Refer to “Guide” before Figure FW-12-AX-3.

Table FW-12-AX-2. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6 nm to 2.5 micron measured using the TSI 3787 CPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	7.1E+3	6.2E+3	5.5E+3	1.0E+4	7.3E+3	1.8E+3
Outdoor 24 SD	3.6E+3	2.7E+3	5.5E+3	6.1E+3	4.5E+3	1.4E+3
Indoor 24h mean	1.7E+3	1.6E+3	1.6E+3	2.5E+3	1.9E+3	3.9E+2
Indoor 24 SD	4.0E+2	5.0E+2	1.0E+3	1.2E+3	8.0E+2	3.5E+2
24h mean In/Out	0.20	0.26	0.26	0.27	0.25	0.03
Highest 8h Outdoor	1.1E+4	8.5E+3	1.2E+4	1.6E+4	1.2E+4	2.7E+3
Highest 8h Indoor	1.8E+3	2.3E+3	3.0E+3	3.8E+3	2.7E+3	7.7E+2
Highest 8 h In/Out	0.17	0.26	0.25	0.24	0.23	0.04
Highest 1h Outdoor	1.3E+4	1.1E+4	2.0E+4	2.0E+4	1.6E+4	4.1E+3
Highest 1 h Indoor ²	1.8E+3	2.3E+3	3.0E+3	3.8E+3	3.3E+3	9.3E+2
Highest 1h In/Out	0.18	0.22	0.19	0.23	0.21	0.02
Time of highest 1h Outdoor	12/19/14 20:49	12/20/14 19:34	12/21/14 19:44	12/22/14 20:14		
Corresponding highest 1h Indoor	12/19/14 21:33	12/20/14 23:08	12/21/14 22:08	12/23/14 0:14		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/19/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-12-AX-3. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100 nm to 2.5 micron measured using the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	7.2E+2	6.5E+2	6.6E+2	1.2E+3	8.0E+2	2.2E+2
Outdoor 24 SD	2.2E+2	3.2E+2	6.5E+2	7.4E+2	4.8E+2	2.2E+2
Indoor 24h mean	3.2E+2	3.2E+2	3.3E+2	5.0E+2	3.7E+2	7.6E+1
Indoor 24 SD	6.7E+1	1.1E+2	1.9E+2	2.5E+2	1.6E+2	7.2E+1
24h mean In/Out	0.36	0.48	0.48	0.46	0.45	0.05
Highest 8h Outdoor	9.4E+2	1.0E+3	1.4E+3	2.0E+3	1.3E+3	4.1E+2
Highest 8h Indoor	3.8E+2	4.6E+2	5.7E+2	7.7E+2	5.4E+2	1.4E+2
Highest 8 h In/Out	0.41	0.45	0.41	0.39	0.41	0.02
Highest 1h Outdoor	1.1E+3	1.4E+3	2.6E+3	2.7E+3	1.9E+3	7.1E+2
Highest 1 h Indoor ²	3.8E+2	4.6E+2	5.7E+2	7.7E+2	6.5E+2	2.2E+2
Highest 1h In/Out	0.37	0.36	0.29	0.35	0.34	0.03
Time of highest 1h Outdoor	12/19/14 22:55	12/20/14 19:50	12/21/14 21:47	12/22/14 23:39		
Corresponding highest 1h Indoor	12/19/14 23:49	12/20/14 21:39	12/21/14 22:31	12/23/14 0:26		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/19/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-12-AX-4. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 6–100 nm based on difference between concentrations measured using the TSI 3787 CPC and the TSI 3781 CPC with size selector.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	6.3E+3	5.5E+3	4.9E+3	9.1E+3	6.5E+3	1.6E+3
Outdoor 24 SD	3.5E+3	2.5E+3	5.0E+3	5.4E+3	4.1E+3	1.2E+3
Indoor 24h mean	1.4E+3	1.3E+3	1.3E+3	2.0E+3	1.5E+3	3.1E+2
Indoor 24 SD	3.5E+2	4.0E+2	8.7E+2	9.9E+2	6.5E+2	2.8E+2
24h mean In/Out	0.18	0.23	0.24	0.25	0.22	0.02
Highest 8h Outdoor	9.8E+3	7.5E+3	1.1E+4	1.4E+4	1.1E+4	2.3E+3
Highest 8h Indoor	1.5E+3	1.8E+3	2.4E+3	3.0E+3	2.2E+3	5.9E+2
Highest 8 h In/Out	0.15	0.24	0.23	0.22	0.21	0.03
Highest 1h Outdoor	1.2E+4	9.3E+3	1.8E+4	1.8E+4	1.4E+4	3.8E+3
Highest 1 h Indoor ²	1.5E+3	1.8E+3	2.4E+3	3.0E+3	2.6E+3	7.1E+2
Highest 1h In/Out	0.16	0.20	0.17	0.20	0.18	0.02
Time of highest 1h Outdoor	12/19/14 20:49	12/20/14 19:34	12/21/14 19:44	12/22/14 20:14		
Corresponding highest 1h Indoor	12/19/14 21:33	12/20/14 23:10	12/21/14 22:01	12/23/14 0:02		

¹Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/19/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-12-AX-5. Daily¹ summary statistics for number concentration (particles cm⁻³) and indoor /outdoor ratios for particles with aerodynamic diameters 100–300 nm based on difference between concentrations measured using the TSI 3781 CPC with size selector and the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	7.0E+5	6.2E+5	6.1E+5	1.1E+6	7.6E+5	2.1E+5
Outdoor 24 SD	2.1E+5	3.2E+5	6.3E+5	7.1E+5	4.7E+5	2.1E+5
Indoor 24h mean	3.1E+5	3.2E+5	3.1E+5	4.8E+5	3.6E+5	7.3E+4
Indoor 24 SD	6.5E+4	1.1E+5	1.9E+5	2.4E+5	1.5E+5	7.0E+4
24h mean In/Out	0.36	0.48	0.49	0.47	0.45	0.05
Highest 8h Outdoor	9.1E+5	9.9E+5	1.3E+6	1.9E+6	1.3E+6	3.8E+5
Highest 8h Indoor	3.7E+5	4.5E+5	5.5E+5	7.4E+5	5.3E+5	1.4E+5
Highest 8 h In/Out	0.41	0.45	0.41	0.39	0.42	0.02
Highest 1h Outdoor	1.1E+6	1.3E+6	2.5E+6	2.6E+6	1.9E+6	6.8E+5
Highest 1 h Indoor ²	3.7E+5	4.5E+5	5.5E+5	7.4E+5	6.3E+5	2.1E+5
Highest 1h In/Out	0.37	0.37	0.29	0.35	0.35	0.03
Time of highest 1h Outdoor	12/19/14 22:55	12/20/14 19:50	12/21/14 21:47	12/22/14 23:39		
Corresponding highest 1h Indoor	12/19/14 23:49	12/20/14 21:39	12/21/14 22:31	12/23/14 0:26		

¹Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/19/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-12-AX-6. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.3–0.4 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	2.2E+4	1.8E+4	4.0E+4	4.2E+4	3.0E+4	1.0E+4
Outdoor 24 SD	1.3E+4	7.7E+3	2.3E+4	2.0E+4	1.6E+4	6.0E+3
Indoor 24h mean	5.5E+3	6.1E+3	1.3E+4	1.4E+4	9.8E+3	4.0E+3
Indoor 24 SD	1.6E+3	1.8E+3	6.3E+3	5.8E+3	3.9E+3	2.2E+3
24h mean In/Out	0.27	0.28	0.33	0.35	0.30	0.03
Highest 8h Outdoor	3.5E+4	2.6E+4	6.5E+4	6.1E+4	4.7E+4	1.7E+4
Highest 8h Indoor	7.2E+3	8.1E+3	2.0E+4	2.1E+4	1.4E+4	6.5E+3
Highest 8 h In/Out	0.21	0.32	0.31	0.34	0.29	0.05
Highest 1h Outdoor	5.5E+4	4.2E+4	7.9E+4	7.9E+4	6.4E+4	1.6E+4
Highest 1 h Indoor ²	7.2E+3	8.1E+3	2.0E+4	2.1E+4	1.6E+4	7.9E+3
Highest 1h In/Out	0.14	0.21	0.29	0.32	0.24	0.07
Time of highest 1h Outdoor	12/20/14 3:37	12/20/14 19:47	12/21/14 21:56	12/22/14 23:54		
Corresponding highest 1h Indoor	12/20/14 4:00	12/20/14 21:22	12/22/14 0:59	12/23/14 0:43		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/19/2014 19:00, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-12-AX-7. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.4–0.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	3.1E+3	2.6E+3	8.5E+3	6.6E+3	5.2E+3	2.5E+3
Outdoor 24 SD	1.8E+3	1.1E+3	6.7E+3	4.3E+3	3.5E+3	2.2E+3
Indoor 24h mean	8.3E+2	9.1E+2	1.8E+3	2.1E+3	1.4E+3	5.5E+2
Indoor 24 SD	2.2E+2	2.5E+2	9.3E+2	9.6E+2	5.9E+2	3.6E+2
24h mean In/Out	0.30	0.29	0.28	0.26	0.28	0.01
Highest 8h Outdoor	4.9E+3	3.5E+3	1.6E+4	1.1E+4	8.8E+3	5.0E+3
Highest 8h Indoor	1.0E+3	1.2E+3	2.8E+3	3.2E+3	2.1E+3	9.5E+2
Highest 8 h In/Out	0.21	0.34	0.18	0.29	0.26	0.06
Highest 1h Outdoor	7.6E+3	6.1E+3	2.2E+4	1.3E+4	1.2E+4	6.1E+3
Highest 1 h Indoor ²	1.0E+3	1.2E+3	2.8E+3	3.2E+3	2.3E+3	1.2E+3
Highest 1h In/Out	0.14	0.21	0.15	0.28	0.19	0.06
Time of highest 1h Outdoor	12/20/14 3:42	12/20/14 19:47	12/22/14 0:34	12/22/14 23:54		
Corresponding highest 1h Indoor	12/20/14 3:42	12/20/14 21:17	12/22/14 4:34	12/23/14 0:35		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/19/2014 19:00, and has < 24h of data. ² Occurring within 4h of highest 1h outdoor concentration.

Table FW-12-AX-8. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.5–0.7 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	1.5E+3	1.5E+3	3.2E+3	3.0E+3	2.3E+3	7.9E+2
Outdoor 24 SD	5.7E+2	4.7E+2	2.5E+3	2.7E+3	1.6E+3	1.0E+3
Indoor 24h mean	5.2E+2	5.9E+2	8.7E+2	1.1E+3	7.6E+2	2.3E+2
Indoor 24 SD	1.0E+2	1.3E+2	4.5E+2	5.6E+2	3.1E+2	2.0E+2
24h mean In/Out	0.36	0.34	0.34	0.31	0.34	0.02
Highest 8h Outdoor	2.0E+3	1.9E+3	5.6E+3	5.4E+3	3.8E+3	1.8E+3
Highest 8h Indoor	5.9E+2	7.2E+2	1.4E+3	1.7E+3	1.1E+3	4.7E+2
Highest 8 h In/Out	0.29	0.38	0.25	0.32	0.31	0.05
Highest 1h Outdoor	2.8E+3	2.7E+3	8.7E+3	8.4E+3	5.6E+3	2.9E+3
Highest 1 h Indoor ²	5.9E+2	7.2E+2	1.4E+3	1.7E+3	1.2E+3	5.8E+2
Highest 1h In/Out	0.22	0.27	0.21	0.22	0.23	0.02
Time of highest 1h Outdoor	12/20/14 3:15	12/20/14 19:47	12/22/14 4:18	12/22/14 18:53		
Corresponding highest 1h Indoor	12/20/14 3:15	12/20/14 23:47	12/22/14 5:00	12/22/14 22:53		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/19/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-12-AX-9. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 0.7–1.0 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	3.8E+2	4.2E+2	2.8E+2	4.5E+2	3.9E+2	6.5E+1
Outdoor 24 SD	1.1E+2	1.1E+2	2.2E+2	4.1E+2	2.1E+2	1.2E+2
Indoor 24h mean	1.3E+2	1.5E+2	1.4E+2	1.7E+2	1.5E+2	1.5E+1
Indoor 24 SD	2.1E+1	2.9E+1	6.7E+1	9.6E+1	5.3E+1	3.0E+1
24h mean In/Out	0.38	0.33	0.41	0.42	0.39	0.04
Highest 8h Outdoor	4.1E+2	4.9E+2	5.0E+2	8.7E+2	5.7E+2	1.8E+2
Highest 8h Indoor	1.3E+2	1.7E+2	2.1E+2	2.9E+2	2.0E+2	5.7E+1
Highest 8 h In/Out	0.32	0.36	0.43	0.33	0.36	0.04
Highest 1h Outdoor	6.4E+2	5.6E+2	9.3E+2	1.1E+3	8.2E+2	2.3E+2
Highest 1 h Indoor ²	1.3E+2	1.7E+2	2.1E+2	2.9E+2	2.2E+2	6.4E+1
Highest 1h In/Out	0.23	0.32	0.26	0.27	0.27	0.03
Time of highest 1h Outdoor	12/20/14 11:09	12/20/14 20:27	12/21/14 21:52	12/22/14 18:53		
Corresponding highest 1h Indoor	12/20/14 11:42	12/20/14 23:33	12/21/14 22:32	12/22/14 22:53		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/19/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-12-AX-10. Daily¹ summary statistics for number concentration (particles L⁻¹) and indoor /outdoor ratios for particles with aerodynamic diameters 1.0–2.5 microns measured with the MetOne BT637S OPC.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	2.7E+2	3.2E+2	1.3E+2	2.2E+2	2.3E+2	7.2E+1
Outdoor 24 SD	1.1E+2	7.7E+1	1.1E+2	1.5E+2	1.1E+2	2.6E+1
Indoor 24h mean	8.4E+1	9.3E+1	6.2E+1	7.3E+1	7.8E+1	1.2E+1
Indoor 24 SD	2.0E+1	2.3E+1	2.8E+1	4.1E+1	2.8E+1	8.2E+0
24h mean In/Out	0.39	0.28	0.35	0.41	0.36	0.05
Highest 8h Outdoor	3.3E+2	3.8E+2	3.3E+2	4.0E+2	3.6E+2	2.9E+1
Highest 8h Indoor	8.0E+1	1.1E+2	1.1E+2	1.2E+2	1.1E+2	1.6E+1
Highest 8 h In/Out	0.24	0.30	0.32	0.31	0.29	0.03
Highest 1h Outdoor	5.7E+2	4.4E+2	4.3E+2	5.3E+2	4.9E+2	6.1E+1
Highest 1 h Indoor ²	8.0E+1	1.1E+2	1.1E+2	1.2E+2	1.2E+2	1.7E+1
Highest 1h In/Out	0.19	0.27	0.27	0.29	0.25	0.04
Time of highest 1h Outdoor	12/20/14 11:05	12/21/14 5:33	12/21/14 21:50	12/22/14 21:43		
Corresponding highest 1h Indoor	12/20/14 11:35	12/21/14 9:13	12/21/14 22:27	12/23/14 0:11		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/19/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-12-AX-11. Summary statistics for estimated PM_{2.5} concentrations ($\mu\text{g m}^{-3}$) calculated from particle number concentrations resolved by size from 6 nm to 2.5 microns (as reported in Tables FW-12-AX-2 to FW-12-AX9) and resulting indoor/outdoor ratios.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	7.2E+0	6.9E+0	7.5E+0	1.1E+1	8.1E+0	1.5E+0
Outdoor 24 SD	1.7E+0	2.1E+0	4.9E+0	6.1E+0	3.7E+0	1.9E+0
Indoor 24h mean	2.5E+0	2.6E+0	2.9E+0	3.9E+0	2.9E+0	5.5E-1
Indoor 24 SD	3.9E-1	6.6E-1	1.4E+0	1.9E+0	1.1E+0	5.8E-1
24h mean In/Out	0.32	0.35	0.37	0.37	0.35	0.02
Highest 8h Outdoor	8.3E+0	9.1E+0	1.3E+1	1.7E+1	1.2E+1	3.6E+0
Highest 8h Indoor	2.8E+0	3.3E+0	4.5E+0	5.9E+0	4.2E+0	1.2E+0
Highest 8 h In/Out	0.34	0.37	0.35	0.34	0.35	0.01
Highest 1h Outdoor	1.0E+1	1.2E+1	2.1E+1	2.2E+1	1.6E+1	5.3E+0
Highest 1 h Indoor ²	2.8E+0	3.3E+0	4.5E+0	5.9E+0	4.8E+0	1.7E+0
Highest 1h In/Out	0.29	0.30	0.27	0.32	0.29	0.02
Time of highest 1h Outdoor	12/20/14 3:14	12/20/14 19:48	12/21/14 21:48	12/22/14 23:46		
Corresponding highest 1h Indoor	12/20/14 3:44	12/20/14 21:42	12/21/14 22:41	12/23/14 0:25		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/19/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-12-AX-12. Summary statistics for concentrations of PM_{2.5} ($\mu\text{g m}^{-3}$) and indoor /outdoor ratios from measurements reported by TSI DustTrak II.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	1.3E-2	1.1E-2	1.9E-2	2.3E-2	1.6E-2	5.0E-3
Outdoor 24 SD	6.5E-3	5.0E-3	1.2E-2	1.4E-2	9.4E-3	3.7E-3
Indoor 24h mean	3.4E-3	3.6E-3	6.5E-3	7.7E-3	5.3E-3	1.9E-3
Indoor 24 SD	7.9E-4	1.1E-3	3.1E-3	3.6E-3	2.2E-3	1.2E-3
24h mean In/Out	0.27	0.28	0.34	0.33	0.31	0.03
Highest 8h Outdoor	1.9E-2	1.6E-2	3.2E-2	3.8E-2	2.6E-2	9.1E-3
Highest 8h Indoor	4.0E-3	4.8E-3	1.0E-2	1.2E-2	7.6E-3	3.3E-3
Highest 8 h In/Out	0.21	0.30	0.31	0.31	0.28	0.04
Highest 1h Outdoor	3.0E-2	2.5E-2	4.8E-2	5.1E-2	3.8E-2	1.1E-2
Highest 1 h Indoor ²	4.0E-3	4.8E-3	1.0E-2	1.2E-2	9.0E-3	4.4E-3
Highest 1h In/Out	0.14	0.21	0.24	0.29	0.22	0.05
Time of highest 1h Outdoor	12/20/14 3:34	12/20/14 19:48	12/21/14 21:54	12/22/14 23:54		
Corresponding highest 1h Indoor	12/20/14 4:10	12/20/14 21:25	12/22/14 0:44	12/23/14 0:40		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/19/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.

Table FW-12-AX-13. Daily¹ summary statistics for concentrations (nanograms m^{-3}) and indoor /outdoor ratios of aerosol black carbon measured using the Aethalometer AE22.

Parameter	Day 1 ¹	Day 2 ¹	Day 3	Day 4	Mean ¹	SD ¹
Outdoor 24h mean	3.5E+2	3.0E+2	4.7E+2	9.8E+2	5.2E+2	2.7E+2
Outdoor 24 SD	1.5E+2	1.4E+2	5.0E+2	6.3E+2	3.5E+2	2.1E+2
Indoor 24h mean	2.0E+2	2.0E+2	3.0E+2	5.5E+2	3.1E+2	1.4E+2
Indoor 24 SD	5.6E+1	6.6E+1	1.9E+2	2.7E+2	1.5E+2	9.0E+1
24h mean In/Out	0.48	0.62	0.61	0.59	0.57	0.06
Highest 8h Outdoor	5.7E+2	4.6E+2	1.0E+3	1.4E+3	8.5E+2	3.6E+2
Highest 8h Indoor	2.4E+2	2.8E+2	5.4E+2	7.3E+2	4.5E+2	2.0E+2
Highest 8 h In/Out	0.41	0.60	0.54	0.53	0.52	0.07
Highest 1h Outdoor	7.0E+2	6.6E+2	2.0E+3	2.1E+3	1.4E+3	6.8E+2
Highest 1 h Indoor ²	2.4E+2	2.8E+2	5.4E+2	7.3E+2	5.5E+2	2.6E+2
Highest 1h In/Out	0.42	0.45	0.36	0.42	0.41	0.03
Time of highest 1h Outdoor	12/19/14 18:12	12/20/14 19:39	12/21/14 21:42	12/23/14 8:45		
Corresponding highest 1h Indoor	12/19/14 18:42	12/20/14 20:09	12/21/14 22:30	12/23/14 10:15		

¹ Based on 24h periods starting / ending at 1pm. Day 1 starts at 12/19/2014 19:00, and has < 24h of data. ²Occurring within 4h of highest 1h outdoor concentration.