

Supplementary materials:

Measure quantity	Site location and visiting time						
	FL1 (10:10)	MB1 (11:00)	FL2 (11:45)	MB2 (12:35)	FL3 (13:00)	FL4 (14:53)	BCr (16:30)
SAC ($\text{m}^2 \text{g}^{-1}$)	24.7 (SD=1.8)	14.2 (SD=4.9)	18.5 (SD=10.7)	18.2 (SD=4.3)	14.3 (SD=7.9)	12.3 (SD=5.8)	14.7 (SD=1.9)
Non-refractory mass to BC mass ratio	101.3 (SD=8.4)	109.2 (SD=23.4)	126.3 (SD=42.2)	325.1 (SD=91.4)	98.7 (SD=29.3)	59.9 (SD=23.5)	155.3 (SD=19.1)
BC ($\mu\text{g m}^{-3}$)	0.20 (SD=0.01)	0.28 (SD=0.06)	0.24 (SD=0.10)	0.14 (SD=0.06)	0.27 (SD=0.09)	0.42 (SD=0.18)	0.20 (SD=0.02)
PPS (nm)	91.7 (SD=5.3)	83.1 (SD=8.8)	76.1 (SD=8.8)	71.2 (SD=5.4)	60.4 (SD=5.8)	58.9 (SD=8.7)	70.3 (SD=5.2)
WD (deg)	243.5 (SD=27.5)	231.5 (SD=8.9)	168.6 (SD=39.9)	231.1 (SD=6.0)	162.0 (SD=5.3)	170.3 (SD=8.5)	237.0 (32.7)
WS (m s^{-1})	1.3 (SD=0.5)	1.9 (SD=0.4)	1.8 (SD=0.8)	3.0 (SD=0.5)	4.3 (SD=0.7)	5.3 (SD=0.7)	2.5 (SD=0.8)
CO (ppb)	182 (SD=13)	262 (SD=56)	186 (SD=13)	275 (SD=26)	219 (SD=23)	192 (SD=22)	191 (SD=16)

Table S1: Selected measurement parameters obtained at various sites during the mobile deployment of CRUISER on June 25, 2007. FL=Fletcher, MB=Mitchell's Bay, BCr=Bear Creek. Value in each entry represents the average during the visiting period and standard deviation is indicated as SD (within parentheses).

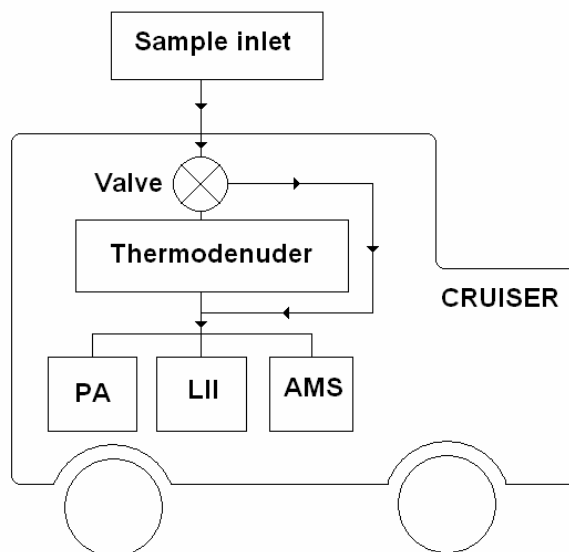


Figure S1: Flow diagram for the thermodenuder experiment.

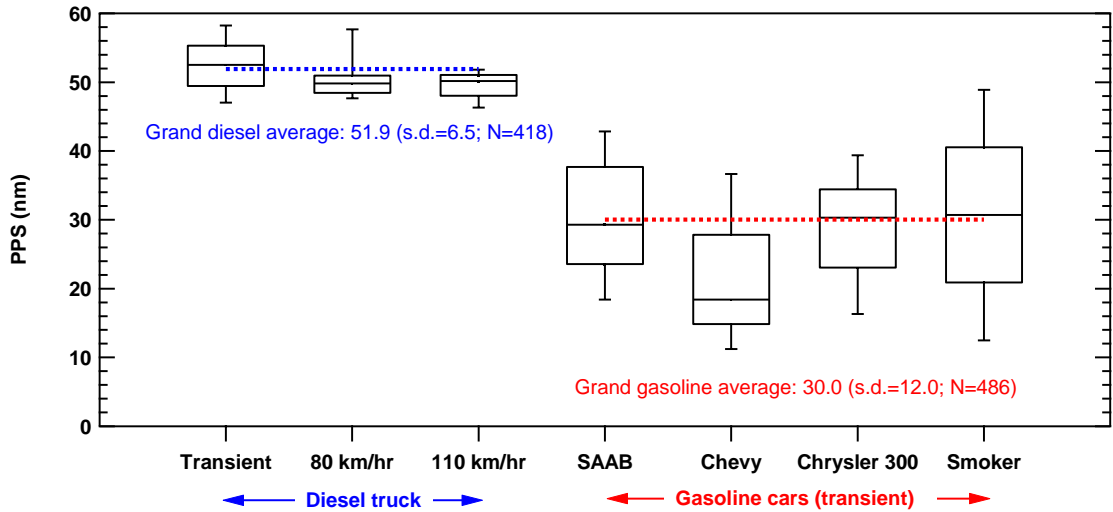


Figure S2: A comparison of the primary particle size (PPS) emitted from a heavy duty diesel truck and four gasoline vehicles. The diesel measurements include a transient driving pattern and two steady states at 80 km/hr and 110 km/hr, respectively. The gasoline measurements are all transient measurements. Each individual box represents the 25th, 50th, and 75th percentiles of the measurement values while the 10th and 90th percentiles are represented by the bottom and top whiskers, respectively.

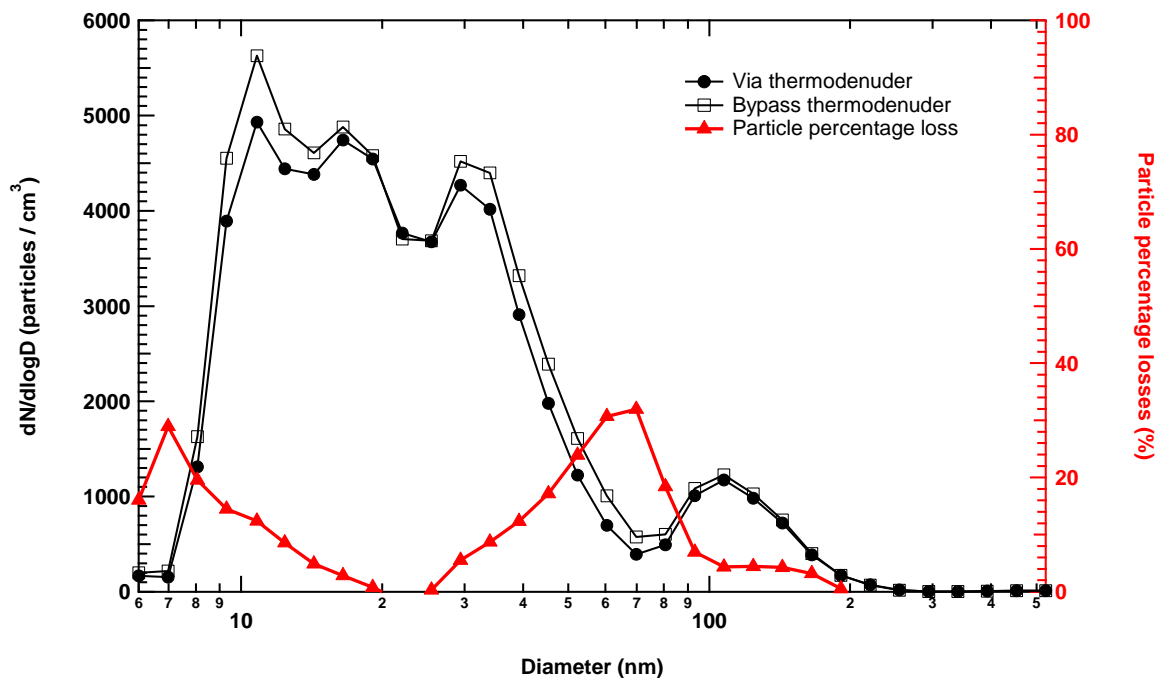


Figure S3: Comparison of the particle number size distribution through the unheated thermodenuder (black solid circles) versus through the bypass sampling path (black open squares). Plotted on the right axis is the particle percentage loss through the thermodenuder (red solid triangles) as a function of particle diameter.

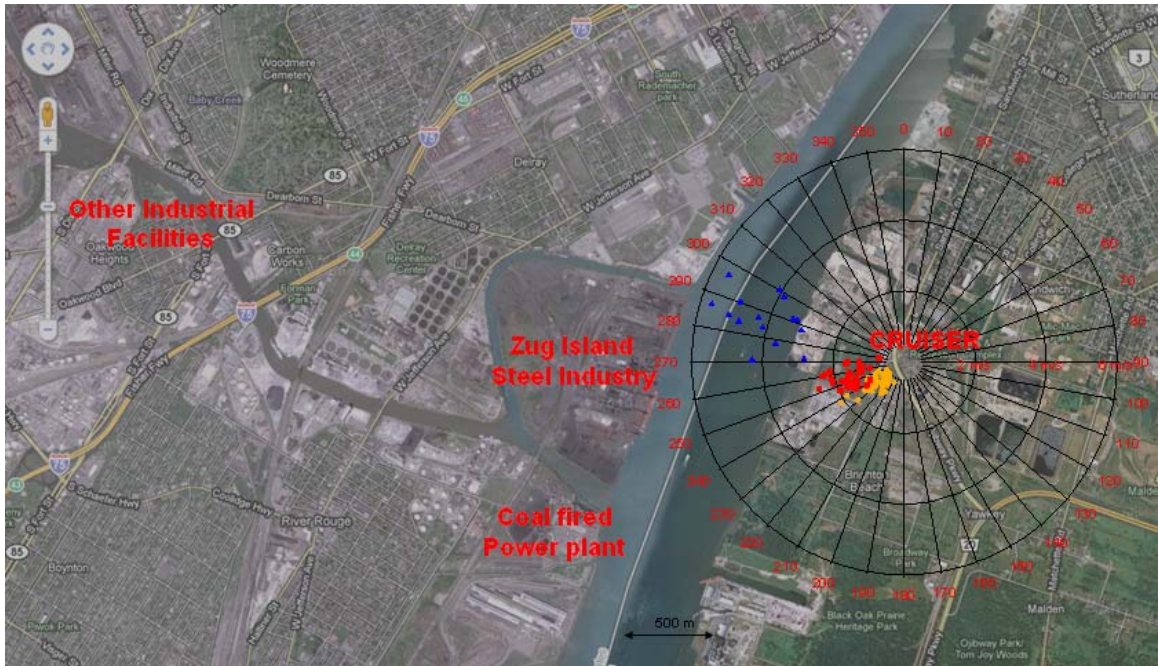


Figure S4: Polar plot for period 1 (orange), period 2 (red), and period 3 (blue) on June 21, 2007, during the BAQS-Met field study. The origin of the polar plot is the location of CRUISER. The wind direction is represented by the angle, while wind speed is expressed by the distance from the origin. Each increment ring represents an increase in wind speed of 2 m s^{-1} .

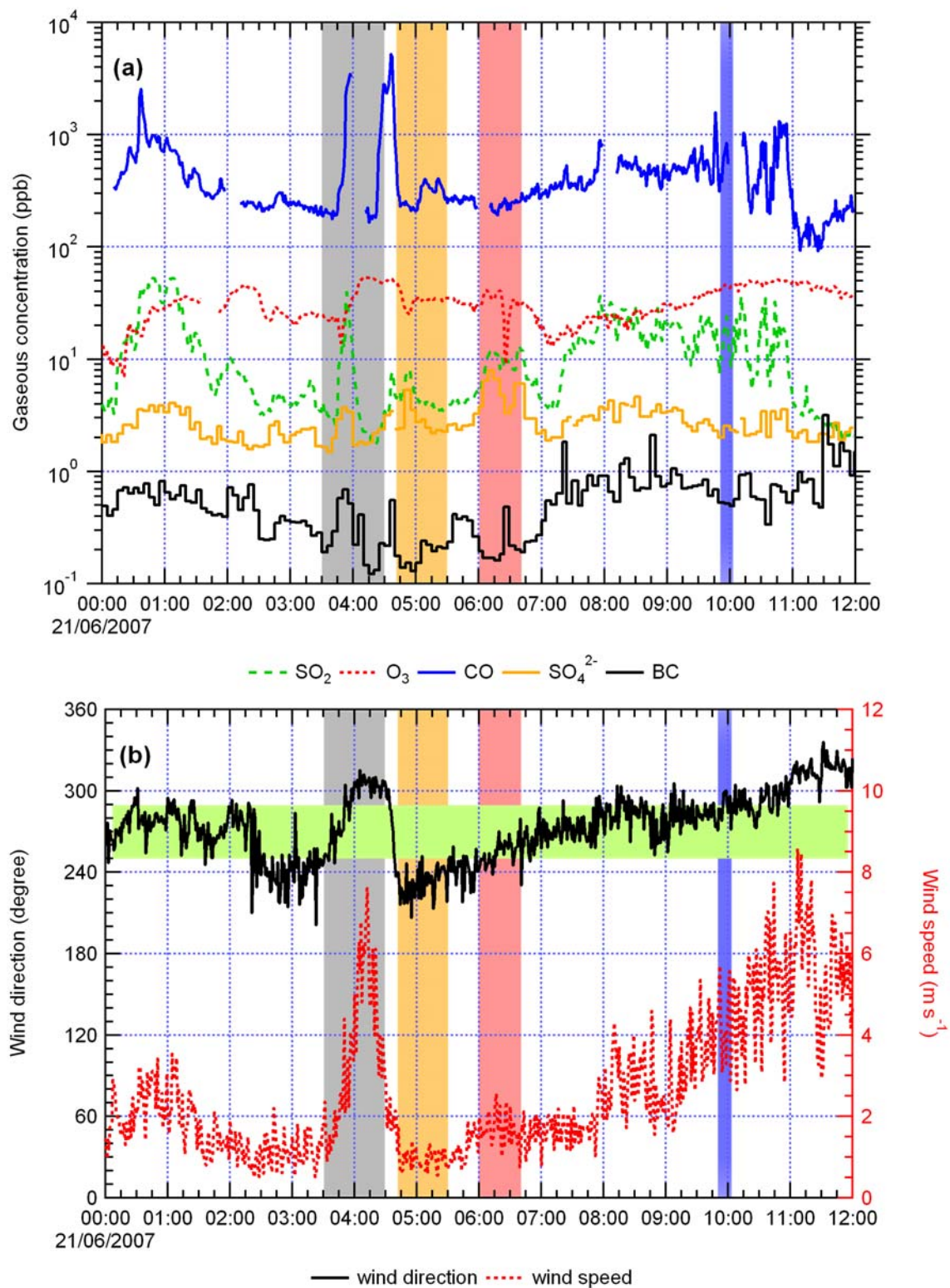


Figure S5: Panel (a) shows the time series SO_2 (green dashed line), O_3 (red dotted line), CO (blue solid line), sulphate (orange solid line), BC (black solid line) on June 21, 2007 during the BAQS-Met study. Panel (b) shows the time series of the wind direction (black

solid line) and wind speed (red dotted line) over the same time period. The approximate time duration for the sweep period and periods 1, 2, and 3 are indicated by the grey, orange, red, and blue areas, respectively. The horizontal green color bar represents the wind direction band that likely passes over the steel mill area.