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Supplemental Materials

Assessment of diesel particulate matter exposure in the workplace: freight terminals

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Repair shop source

All motor vehicle tracers are weighted average of all shops, all other tracers are the average of shops 14 and 15 (non-smoke impacted). OC has been adjusted by site for CMB wood smoke, cigarette smoke and natural gas contributions.

Table S1.

ug/ug OC	Shop profile		
Elemental carbon	0.386979	weight average by OC concentration	
uncertainty	0.019349	SHOP3	10%
levoglucosan	0.001016	SHOP8	15%
uncertainty	0.000998	SHOP11	40%
ANTEISO-TRIACONTANE	9.66E-07	SHOP14	24%
uncertainty	9.19E-07	SHOP15	11%
ISO-HENTRIACONTANE	0		
uncertainty	9.19E-07		
ANTEISO-DOTRIACONTANE	1.34E-06		
uncertainty	5.56E-07		
ISO-TRITRIACONTANE	0		
uncertainty	9.19E-07		
22,29,30-TRISNORHOPANE	3.33E-05		
uncertainty	6.77E-06		
17B-21A-30-NORHOPANE	0.000161		
uncertainty	3.21E-05		
17A-21B-HOPANE	0.000152		
uncertainty	3.04E-05		
22S,AB-30-HOMOHOPANE	5.82E-05		
uncertainty	1.18E-05		
22R,AB-30-HOMOHOPANE	5.74E-05		
uncertainty	1.15E-05		
20R,ABB-CHOLESTANE	3.31E-05		
uncertainty	6.62E-06		
20S,ABB-CHOLESTANE	2.24E-05		
uncertainty	4.34E-06		
20R,ABB-SITOSTANE	3.49E-05		
uncertainty	7E-06		
20S,ABB-SITOSTANE	2.31E-05		
uncertainty	4.67E-06		
HEXADECYLCYCLOHEXANE	0.000119		
uncertainty	2.39E-05		
HEPTADECYLCYCLOHEXANE	7.18E-05		
uncertainty	1.46E-05		
OCTADECYLCYCLOHEXANE	8.06E-05		
uncertainty	1.62E-05		
NONADECYLCYCLOHEXANE	5.6E-05		
uncertainty	1.15E-05		
BENZ(DE)ANTHRACEN-7-ONE	0.000164		
uncertainty	3.3E-05		
BENZO(B)FLUORANTHENE	0.000268		
uncertainty	5.37E-05		

BENZO(E)PYRENE	0.000207
uncertainty	4.16E-05
INDENO(CD)PYRENE	0.000287
uncertainty	5.74E-05
DIBENZ(AH)ANTHRACENE	2.88E-05
uncertainty	5.91E-06
BENZO(GHI)PERYLENE	0.000378
uncertainty	7.56E-05

Table S2. Concentration of air toxics and relevant source tracers normalized by organic carbon (OC) concentration.

Air Toxics (ng µg OC^{-1})	5 yard	7 yard	8 yard	11 yard	Mex yard	3 dock	5 dock	7 dock	8 dock	11 dock	14 dock	15 dock	Mex dock	3 repair shop	8 repair shop	11 repair shop	14 repair shop	15 repair shop
Quinoline[e]	ND	0.05	0.03	10.15	N/A	0.04	ND	0.02	0.02	2.85	0.04	0.03	N/A	0.03	0.01	0.02	0.01	0.04
Isoquinoline[e]	ND	0.08	0.08	3.54	N/A	0.12	ND	0.04	0.03	0.66	0.08	0.05	N/A	0.06	0.02	0.02	0.02	0.05
methyl quinoline[e]	ND	0.06	0.10	7.38	N/A	0.05	ND	0.02	0.04	0.88	0.05	0.11	N/A	0.04	0.04	0.07	0.05	0.09
dimethyl quinoline[e]	ND	0.04	0.05	1.60	N/A	0.08	0.05	0.03	0.02	0.17	0.05	0.10	N/A	0.09	0.09	0.05	0.20	0.12
Dibenzofuran[e]	0.03	0.02	ND	0.24	N/A	0.07	0.04	ND	ND	0.07	ND	0.03	N/A	0.03	ND	0.01	0.01	0.03
Carbazole[e]	ND	ND	ND	4.98	N/A	ND	ND	ND	ND	0.44	ND	ND	N/A	ND	ND	0.03	ND	ND
Dimethyl Phthalate[c]	ND	ND	0.02	ND	N/A	1.65	ND	ND	0.10	0.03	0.27	0.01	N/A	0.71	0.05	ND	0.42	0.23
Dibutyl Phthalate[c]	ND	0.05	ND	ND	N/A	1.55	1.85	0.90	0.34	0.04	1.17	1.63	N/A	0.68	0.99	0.38	0.71	0.99
Bis(2-ethylhexyl)phthalate[c]	8.21	1.53	0.51	0.28	N/A	3.97	11.03	1.27	1.14	0.29	1.49	3.52	N/A	1.55	1.07	1.31	1.08	3.33
Fluoranthene[c]	0.01	0.04	0.03	17.43	0.18	0.08	0.02	0.02	0.02	2.79	0.04	0.03	0.01	0.09	0.06	0.24	0.07	0.03
Acephenanthrylene[e]	0.02	0.01	0.01	ND	ND	ND	ND	0.01	0.01	0.04	0.01	ND	ND	0.05	0.03	0.03	0.02	0.02
Pyrene[c]	0.01	0.03	0.03	13.71	0.17	0.09	0.02	0.02	0.04	2.05	0.04	0.02	0.03	0.21	0.13	0.28	0.11	0.03
cyclopenta(cd)pyrene[c]	ND	0.21	ND	9.40	ND	ND	ND	0.14	0.19	0.44	0.23	ND	0.03	1.39	0.95	1.03	1.06	ND
benzo(GHI)fluoranthene[c]	ND	0.19	0.21	7.27	ND	0.33	ND	ND	0.18	0.54	0.20	ND	0.10	1.45	0.46	0.84	0.46	ND
Benz(a)anthracene[c]	ND	0.03	0.02	5.45	0.10	0.04	ND	0.02	0.02	0.14	0.04	0.02	0.02	0.25	0.07	0.27	0.09	0.02
chrysene/triphenylene[c]	ND	0.03	0.03	5.94	0.06	0.03	ND	0.03	0.04	0.18	0.05	0.03	0.03	0.32	0.10	0.33	0.13	0.02
Benzo (b)fluoranthene[c]	0.10	0.08	0.08	2.44	0.06	ND	0.09	0.07	0.06	0.12	0.09	0.09	0.04	0.28	0.14	0.30	0.18	0.08
benzo(k)fluoranthene[c]	ND	0.00	ND	1.91	0.10	ND	ND	0.00	0.00	0.03	0.00	ND	0.00	0.23	0.10	0.26	0.12	ND
Benzo(j)fluroanthene[e]	ND	0.07	ND	0.21	ND	ND	ND	ND	ND	0.07	ND	ND	ND	0.13	0.07	0.09	0.06	ND
benzo(e)pyrene[e]	0.05	0.07	0.05	1.79	0.07	ND	0.05	0.05	0.04	0.08	0.06	0.04	0.03	0.32	0.18	0.31	0.22	0.05
benzo(a)pyrene[c]	ND	0.06	0.05	1.60	ND	ND	ND	0.04	0.04	0.07	0.05	0.04	ND	0.36	0.22	0.34	0.26	0.04
Perylene[e]	ND	ND	ND	0.31	ND	ND	ND	ND	ND	0.04	ND	ND	ND	0.09	0.06	0.09	0.07	0.02

indeno(cd)pyrene[c]	ND	0.04	0.03	0.61	ND	ND	ND	0.03	0.03	0.05	0.03	ND	ND	0.34	0.19	0.27	0.28	0.01
dibenz(ah)anthracene[c]	ND	ND	ND	0.20	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	0.02	0.03	0.02	ND
benzo(ghi)perylene[c]	ND	0.08	0.05	0.42	0.42	ND	ND	0.07	0.04	0.06	0.04	0.04	0.06	0.47	0.30	0.33	0.36	0.05
Coronene[c]	ND	0.06	0.03	0.06	ND	ND	ND	0.04	0.03	0.03	0.03	ND	0.07	0.32	0.18	0.13	0.29	0.05
	5 yard	7 yard	8 yard	11 yard	Mex yard	3 dock	5 dock	7 dock	8 dock	11 dock	14 dock	15 dock	Mex dock	3 repair shop	8 repair shop	11 repair shop	14 repair shop	15 repair shop
9,10 Anthraquinone[c]	ND	0.26	ND	4.45	ND	ND	ND	0.18	ND	0.71	0.22	0.27	0.03	ND	ND	0.18	0.14	0.27
1h-phenalen-1-one [c]	ND	0.24	ND	ND	ND	ND	ND	ND	ND	0.29	0.24	ND	ND	0.00	0.22	ND	0.17	0.00
Benz(a)anthracene-7,12-dione[c]	ND	ND	ND	0.81	ND	ND	0.00	ND	ND	ND	0.00	ND	ND	0.00	ND	ND	ND	0.00
benz(de)anthracene-7-one[e]	ND	ND	ND	0.48	ND	ND	0.00	ND	ND	0.22	ND	ND	ND	0.34	0.20	0.17	ND	0.00
1,8-naphthalic anhydride[c]	ND	ND	ND	2.15	ND	ND	0.00	ND	ND	ND	0.00	ND	ND	0.00	ND	ND	0.00	0.00
Source Tracers																		
methyl PAH[c,e]	ND	ND	ND	1.24	0.01	ND	ND	ND	ND	13.35	ND	ND	0.01	ND	0.16	ND	ND	ND
Hopanes[c,d]	0.26	0.74	0.76	0.56	0.74	0.22	0.07	0.14	0.17	0.12	0.48	0.16	0.10	0.07	0.46	0.55	0.42	0.23
Steranes[c,d]	ND	0.31	0.31	0.22	0.43	ND	ND	0.07	0.10	ND	0.20	0.08	0.04	ND	0.18	0.18	0.15	0.12
Cyclohexanes[c,e]	0.77	0.88	0.64	0.62	1.07	1.59	ND	0.11	0.30	ND	0.63	0.36	0.19	0.72	0.51	0.34	0.31	0.27
Isoprenoids[d]	ND	ND	0.30	1.76	ND	1.70	ND	ND	0.84	1.24	0.70	ND	ND	1.37	0.83	0.32	0.46	0.79
iso-alkanes[d]	0.01	ND	ND	ND	0.78	0.01	ND	ND	ND	ND	0.01	0.01	0.09	0.01	4.64	3.61	0.00	0.00
Levoglucosan[c]	5.34	9.72	14.92	17.79	ND	ND	3.59	7.17	10.81	15.38	13.71	ND	ND	6.47	10.86	8.07	0.52	1.49
Cholesterol[c]	ND	ND	ND	ND	0.52	ND	ND	ND	ND	ND	ND	ND	0.16	ND	ND	3.07	ND	ND
Alkanes[c,e]	0.02	1.21	0.61	ND	14.89	0.01	0.44	2.08	0.75	1.71	1.35	2.94	4.41	1.29	9.65	6.00	0.45	0.01
aliphatic diacids[c]	0.00	ND	2.28	2.43	0.59	0.76	0.60	ND	ND	0.56	2.91	0.48	0.35	0.00	0.66	2.42	0.00	0.10
alkanoic acids[c,e]	3.38	2.53	1.17	1.59	8.65	19.98	1.39	2.01	2.25	0.88	2.69	3.25	2.81	1.30	2.70	1.96	0.37	2.96
aromatic acids[c]	0.08	0.35	0.23	1.35	1.89	1.02	1.04	0.01	ND	0.99	0.10	0.04	1.48	0.16	0.01	0.64	0.49	0.37
Steroids[e]	ND	52.19	32.09	25.15	0.76	180.71	ND	ND	30.93	ND	17.86	ND	ND	42.35	30.55	20.94	21.16	ND

Bulk parameters ($\mu g\ m^{-3}$)																		
Organic carbon[a]	7.38	7.40	9.83	6.91	12.49	4.64	9.99	12.56	12.08	9.10	9.25	7.46	21.79	7.58	15.92	37.32	17.41	8.03
Elemental carbon[a]	0.18	1.63	3.31	0.41	3.19	0.87	0.30	2.42	1.35	0.76	0.52	1.01	3.65	6.19	2.93	12.44	5.44	1.17
EC/TC[b]	0.02	0.18	0.25	0.06	0.20	0.16	0.03	0.16	0.10	0.08	0.05	0.12	0.14	0.45	0.16	0.25	0.24	0.13

[a] Carbon concentrations are in $\mu g\ m^{-3}$.

[b] Elemental carbon divided by total carbon. ND is given for any value which is below the uncertainty for compound.

[c] Identification based on quantitative standard.

[d] Identification based on qualitative standard.

[e] Identification based on mass spectra libraries (NIST 98 and WILEY138)

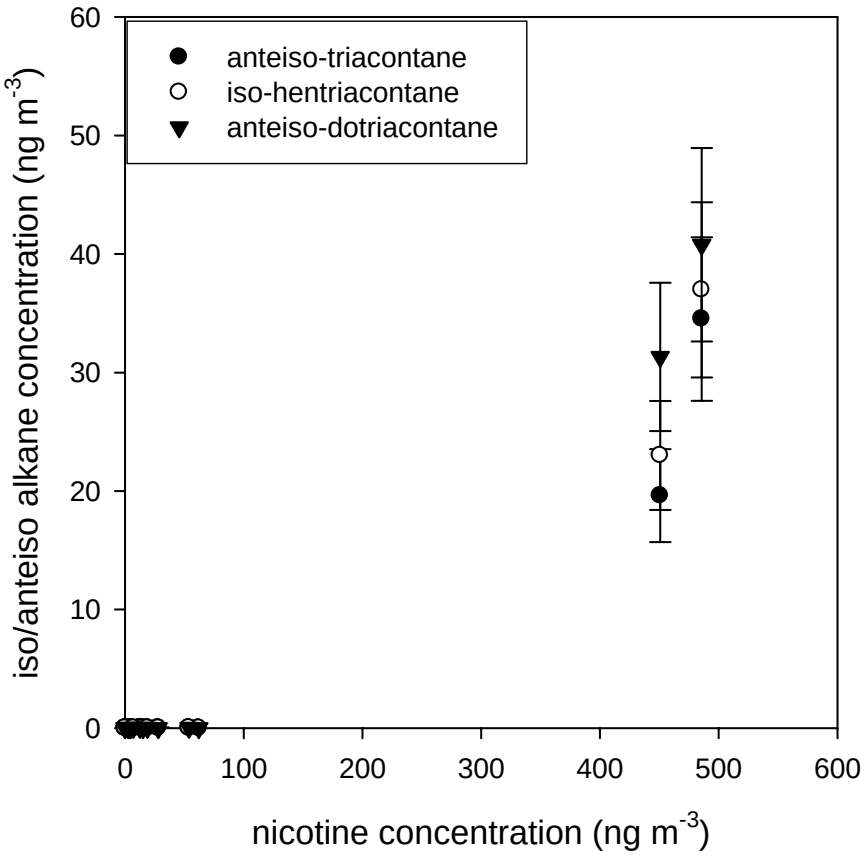

Figure S 1

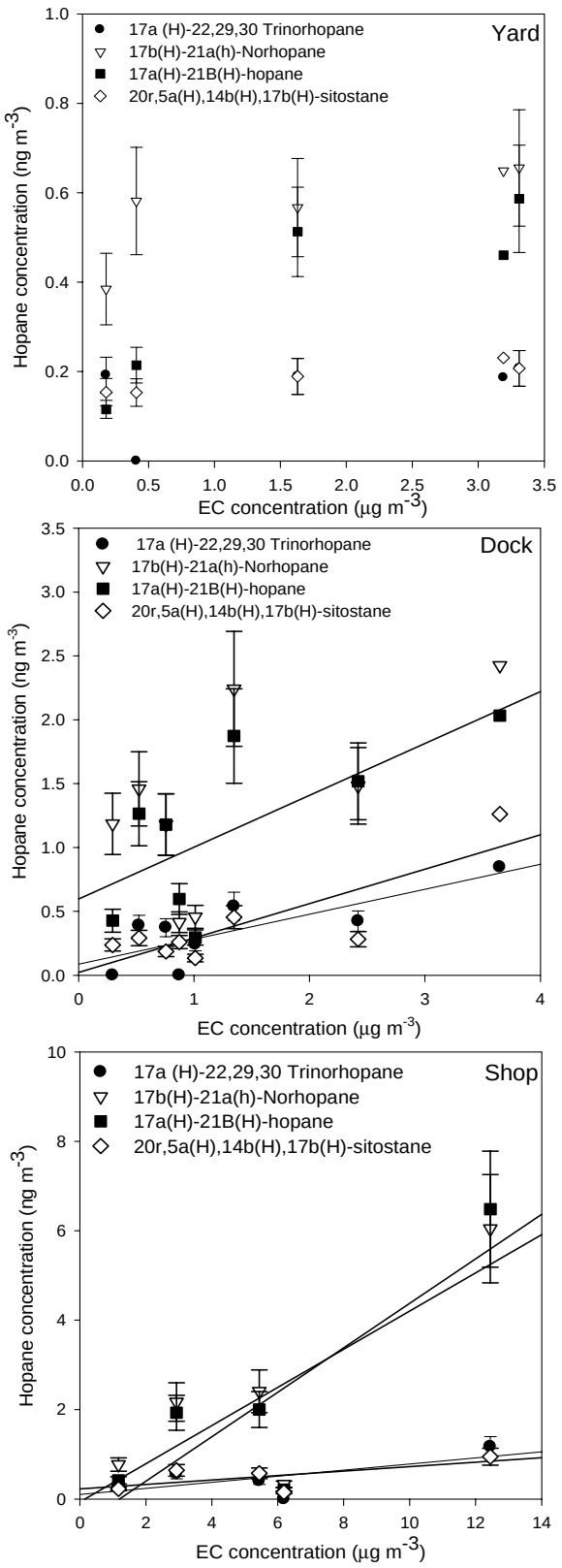

Figure S 2 Correlation plots for key mobile source hopanes and steranes with EC (elemental carbon) including published relationships for gasoline, high load diesel and lubricating oil-impacted exhaust in the repair shop plot.