

Supporting Information

Emissions of Tetrachlorobiphenyls (PCBs 47, 51 and 68) from Polymer Resin on Kitchen Cabinets as a Non-Aroclor Source to Residential Air

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Laboratory Methods

Prior to deployment, the sampling media (PUF disk) was cleaned using accelerated solvent extraction (ASE 350), wrapped in aluminum foil, and stored in a freezer until deployment. After collection, samples were wrapped in combusted aluminum foil and refrigerated at -20° C until extraction. All samples were spiked with 50 ng of surrogate standards (PCB14 (3,5-dichlorobiphenyl), PCB65-d5 (2,3,5,6-tetrachlorobiphenyl-d5, deuterated), and PCB166 (2,3,4,4',5,6-hexachlorobiphenyl)), extracted with a 1:1 Hexane:Acetone mixture in an ASE 350, cleaned with an acidified silica column, and concentrated with a Caliper TurboVap II. The samples were then spiked with 50 ng of internal standard (PCB30-d5 (2,4,6-trichlorobiphenyl-2',3',4',5',6'-d5, deuterated) and PCB204 (2,2',3,4,4',5,6,6'-octachlorobiphenyl)) just prior to instrument analysis.

Instrumental Parameters

The samples were analyzed by gas chromatography with tandem mass spectrometry (Agilent 7890A GC system, Agilent 7000 Triple Quad, Agilent 7693 autosampler) using a modified EPA method 1668a. The GC had a Supelco SPB-Octyl capillary column (5% phenyl methyl siloxane, 30 m × 0.25 mm ID, 0.25 µm film thicknesses) installed and utilized helium as the carrier gas (0.8 mL/min) and nitrogen/ argon as the collision gas. The GC was run in solvent vent injection mode (initial temperature 45 °C, initial time 0.06 min, ramp 600 °C/min to inlet temperature 325 °C at 4.4 psi). The oven temperature program was 45 °C for 2.56 min, 45 to 75 °C at 100 °C/min and hold for 5 min, 75 to 150 °C at 15 °C/min and hold for 1 min, 150 to 280 at 2.5 °C/min and final hold 5 min. The triple quadrupole MS electron ionization source was set to 260 °C.

In select instances in unexpectedly high congener results, identity was confirmed by reanalyzing the samples using the same instrument methods equipped with an Agilent Technologies DB-5 capillary column (30 m × 0.25 mm ID, and 1.0 µm film thickness) and an Agilent Technologies DB-1701 capillary column (30 m × 0.25 mm ID, and 0.25 µm film thickness). Identities was also confirmed by mass spectra when the responses were measured above the full scan detection limit.

Quality Assurance and Quality Control Data

The quality of the chemical measurements was assessed using surrogate recoveries, blanks, and duplicate sampling. Average surrogate recoveries for all samples and blanks were $82 \pm 9\%$, $86 \pm 8\%$, and $93 \pm 7\%$ for PCB 14, PCB 65-d5, and PCB 166, respectively. There was no statistical difference in recoveries between samples and blanks. The average sum PCB level in all blanks was 2.30 ± 0.62 ng. Likewise, there was no statistical difference in blank levels between field and lab blanks.

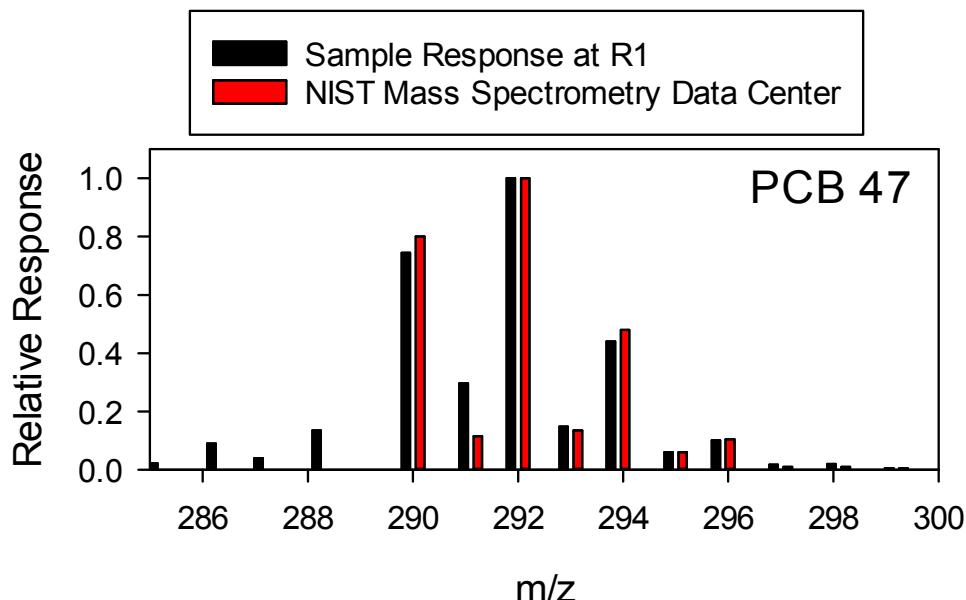


Figure S1: Mass spectra results for PCB 47 in sample R1.

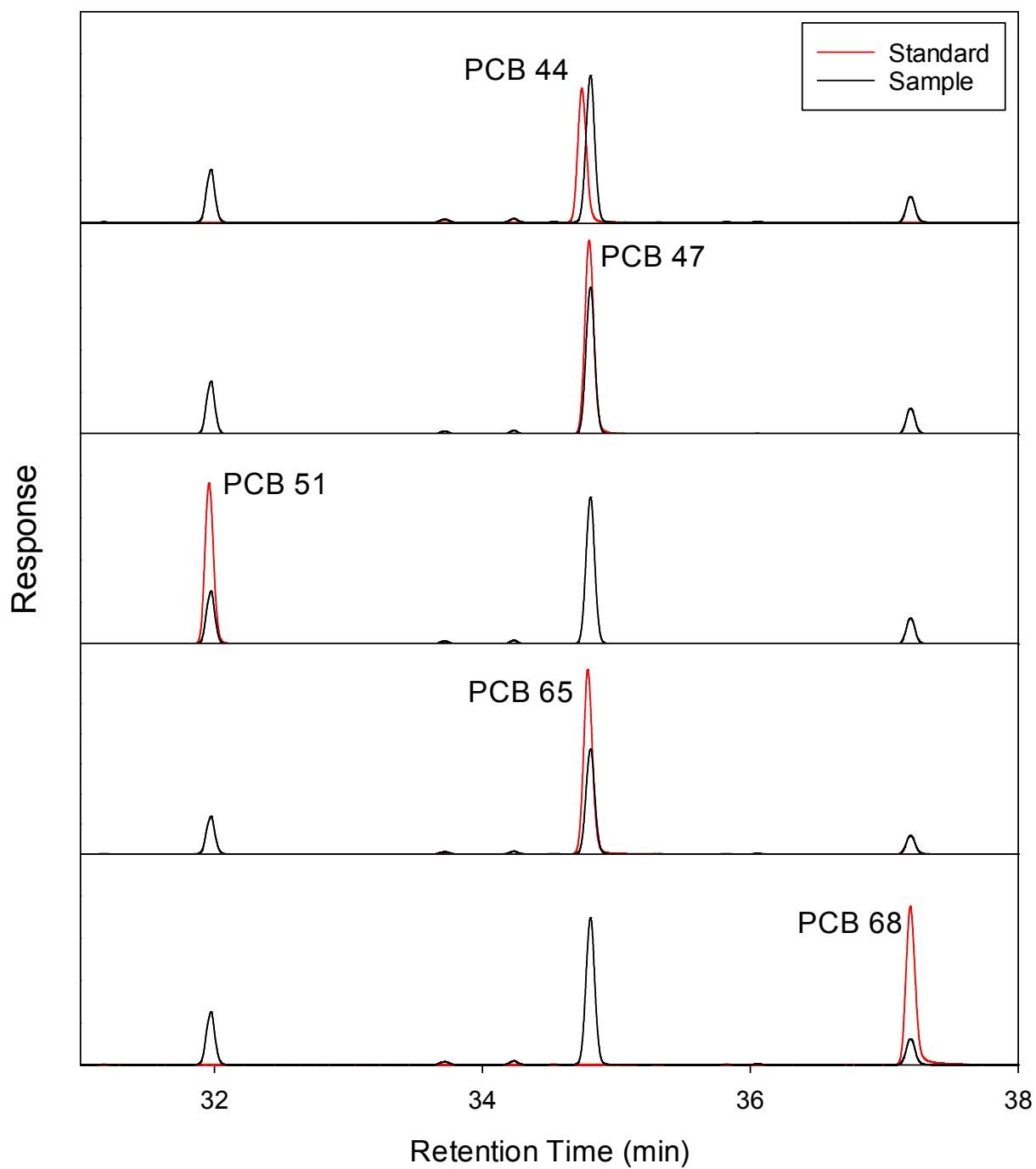


Figure S2: GC-MS/MS Results for PCBs 44, 47, 51, 65, and 68 on a Supelco SPB-Octyl Capillary Column

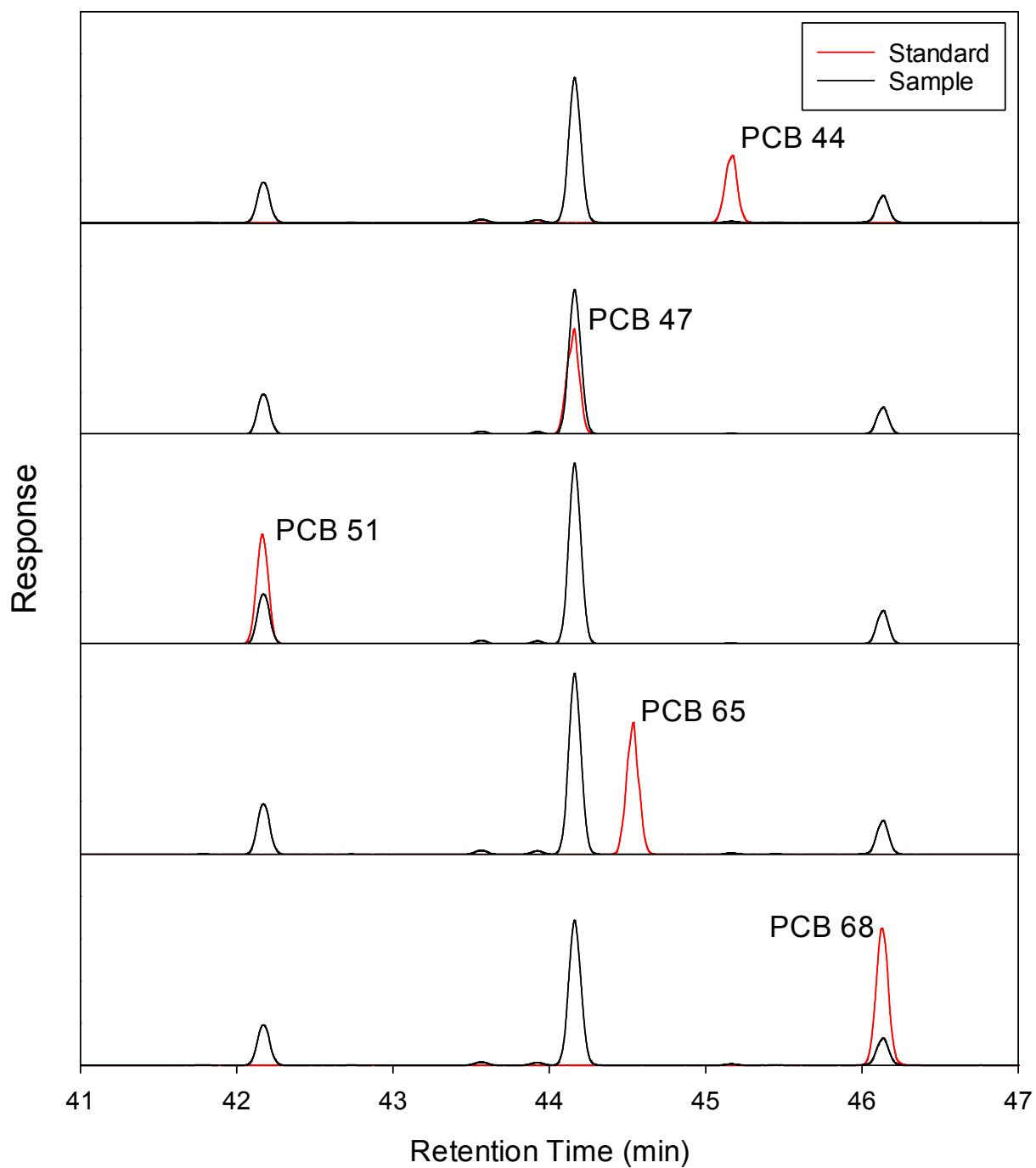


Figure S3: GC-MS/MS Results for PCBs 44, 47, 51, 65, and 68 on an Agilent Technologies DB5 Capillary Column.

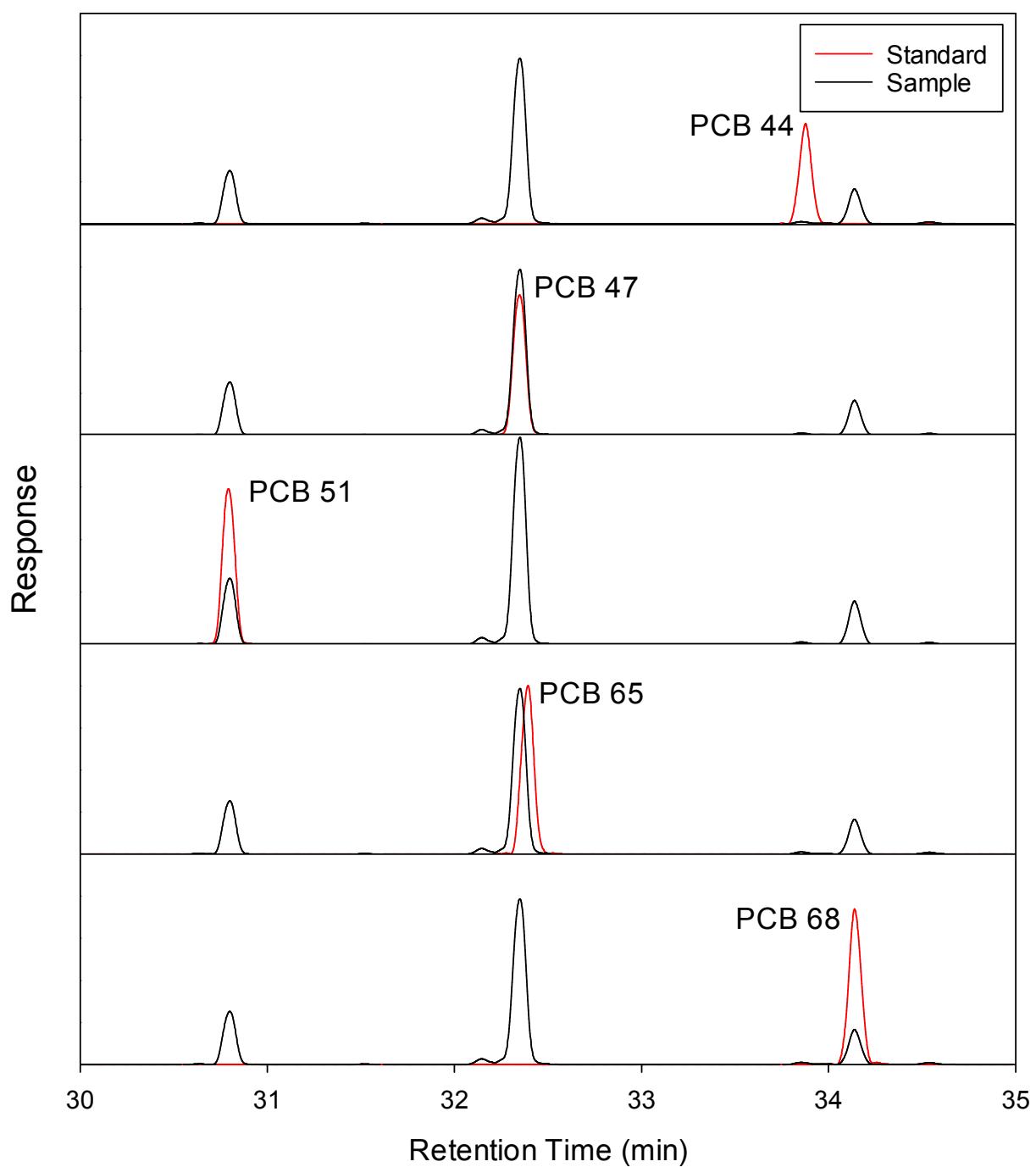


Figure S4: GC-MS/MS Results for PCBs 44, 47, 51, 65, and 68 on an Agilent Technologies DB1701 Capillary Column.

44/47/65	0.0476	0.0828	117	0.1712	0.2166	187	0.0065	0.003
45	0.0038	0.0028	118	0.01	0.0332	188	0.0056	0.1095
46	0.003	0.0012	120	0.0017	0.0006	189	0.0042	0.0005
48	0.0045	0.0055	121	0.0012	0.0009	190	0.0036	0.0004
49/69	0.0271	0.0333	122	0.0012	0.0009	191	0.0025	0.0009
50/53	0.0365	0.0328	123	0.0006	0.0014	192	0.0025	0.0008
51	0.0021	0.0121	126	0.0071	0	194	0.0063	0.0021
52	0.0536	0.0808	127	0.0021	0.0005	195	0.0067	0.0014
54	0.0028	0	129/138/163	0.0103	0.0147	196	0.0034	0.0018
55	0.0041	0.0027	130	0.006	0.001	197	0.0106	0.0034
56	0.0051	0.0111	131	0.0072	0.001	198/199	0.0051	0.0017
57	0.0027	0.0009	132	0.0152	0.0049	200	0.0061	0.0015
58	0.0009	0.0009	133	0.0076	0.0014	201	0.0028	0.0019
59/62/75	0.0088	0.0055	134	0.0054	0	202	0.0161	0.0107
60	0.0053	0.0047	135/151	0.0102	0.0057	203	0.0023	0.0022
61/70/74/76	0.0349	0.0821	136	0.0081	0.0039	205	0.0055	0.0016
63	0.0012	0.0037	137	0.0045	0.0017	206	0.017	0.0045
64	0.0112	0.0148	139/140	0.0048	0.0044	207	0.0095	0.0048
66	0.0143	0.0313	141	0.0102	0.0023	208	0.0065	0.0018
67	0.0021	0.003	142	0.0106	0.0009	209	0.0675	0.0485

Pearson Correlations with Aroclors

Table S2: Summary of Pearson Correlations for all samples and Aroclors.

<i>Residence</i>	1221	1232	1016	1242	1248	1254	1260	1262	
<i>Inside</i>	R1	0.07	0.08	0.36	0.34	0.35	0.08	-0.05	-0.06
	R2	0.42	0.49	0.70	0.70	0.42	0.23	0.06	-0.12
	R3	0.26	0.38	0.78	0.78	0.51	0.20	-0.01	-0.12
	R4	0.00	0.02	0.16	0.24	0.41	0.57	0.14	-0.09
	R5	0.12	0.21	0.48	0.50	0.38	0.21	0.01	-0.10
	R6	0.19	0.24	0.33	0.32	0.17	0.13	0.04	-0.08
	R7	0.06	0.19	0.73	0.78	0.64	0.38	0.05	-0.13
	R8	0.30	0.32	0.38	0.40	0.27	0.19	0.05	-0.09
	R9	0.29	0.37	0.67	0.66	0.47	0.21	0.00	-0.12
	R10	0.17	0.20	0.27	0.26	0.16	0.04	-0.03	-0.07
	R11	0.05	0.06	0.24	0.23	0.29	0.14	0.01	-0.07
	R12	0.04	0.10	0.31	0.30	0.21	0.05	-0.05	-0.07
	R13a	-0.01	0.09	0.63	0.75	0.90	0.48	0.12	-0.12
	R13b	0.02	0.04	0.11	0.13	0.19	0.19	0.05	-0.06
	R14	0.40	0.50	0.78	0.75	0.31	0.06	-0.04	-0.11
	R15	0.03	0.12	0.57	0.63	0.65	0.63	0.13	-0.13
	R16	0.13	0.22	0.74	0.75	0.69	0.31	0.00	-0.12
<i>Outside</i>	R1	0.03	0.05	0.17	0.19	0.22	0.24	0.09	-0.07
	R2	0.03	0.09	0.44	0.51	0.61	0.72	0.29	-0.11
	R3	0.04	0.12	0.51	0.59	0.64	0.68	0.28	-0.11
	R4	-0.03	0.00	0.26	0.37	0.61	0.88	0.28	-0.11
	R5	0.05	0.23	0.93	0.90	0.56	0.25	0.09	-0.12
	R6	0.04	0.11	0.40	0.43	0.42	0.51	0.29	-0.10
	R7	-0.01	0.04	0.36	0.44	0.59	0.81	0.34	-0.11
	R8	0.02	0.07	0.38	0.45	0.51	0.74	0.49	-0.09
	R12	0.03	0.07	0.23	0.28	0.33	0.53	0.26	-0.08
	R14	0.08	0.18	0.60	0.61	0.46	0.38	0.17	-0.11
	R31	0.02	0.07	0.35	0.42	0.54	0.78	0.42	-0.10
	R34	-0.02	-0.01	0.17	0.24	0.39	0.87	0.55	-0.09

Testing for Outliers

Table S3: Summary of Cook's Distance and leverage for PCB 47 for each indoor sample and Aroclor.

Residence	Year	Leverage	Cook's Distance								Avg
			1221	1232	1016	1242	1248	1254	1260	1262	
R1	2017	0.91	1.57	1.07	10.99	6.44	5.04	1.42	0.10	1.13	3.47
R2	1915	0.19	0.08	0.07	1.34	0.14	0.05	0.40	1.30	0.03	0.43
R3	Mid 1900s	0.20	0.09	0.08	1.45	0.11	0.03	0.46	1.34	0.03	0.45
R4	1926	0.10	0.04	0.03	0.69	0.29	0.19	0.25	0.26	0.02	0.22
R5	1980	0.40	0.30	0.29	0.86	1.67	1.99	4.88	3.88	0.10	1.75
R6	2014	0.75	0.27	0.40	3.07	6.31	6.68	25.58	29.86	0.00	9.02
R7	Mid 1900s	0.19	0.10	0.08	1.20	0.11	0.01	0.66	1.02	0.04	0.40
R8	1901	0.17	0.09	0.08	1.09	0.22	0.04	0.25	0.54	0.04	0.29
R9	2014	0.70	0.45	0.56	1.80	7.52	7.82	21.10	21.64	0.05	7.62
R10	2014	0.81	0.00	0.02	1.21	1.51	1.75	13.06	20.50	0.16	4.78
R11	2016	0.90	0.05	0.00	0.68	4.43	5.29	16.08	19.95	0.21	5.84
R12	2004	0.36	0.19	0.18	0.93	0.06	0.12	3.39	5.19	0.05	1.26
R13a	1914	0.24	0.15	0.13	1.21	0.05	0.37	0.71	0.82	0.06	0.44
R13b	1914	0.18	0.08	0.07	1.13	0.14	0.03	1.14	1.22	0.03	0.48
R14	2007	0.23	0.10	0.09	1.77	0.09	0.03	0.41	1.61	0.03	0.52
R15	1925	0.16	0.06	0.05	1.14	0.19	0.10	0.25	1.43	0.02	0.41
R16	1958	0.70	0.47	0.58	1.97	8.40	8.68	21.53	21.64	0.06	7.92

Congener Profiles for Newest Residences

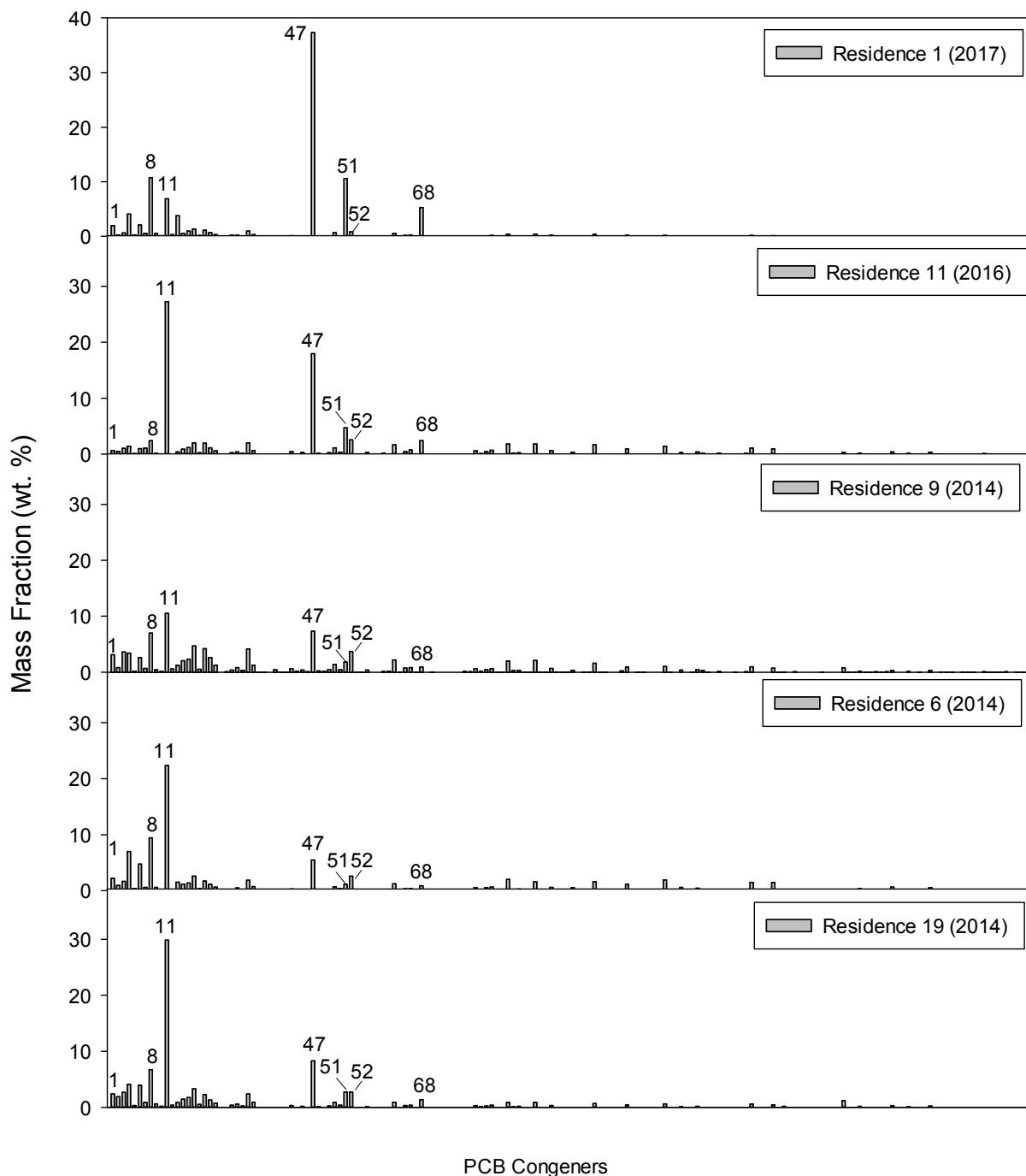


Figure S5: Full congener profiles for the newest building in this study.

Full Surface Emission Congener Profiles

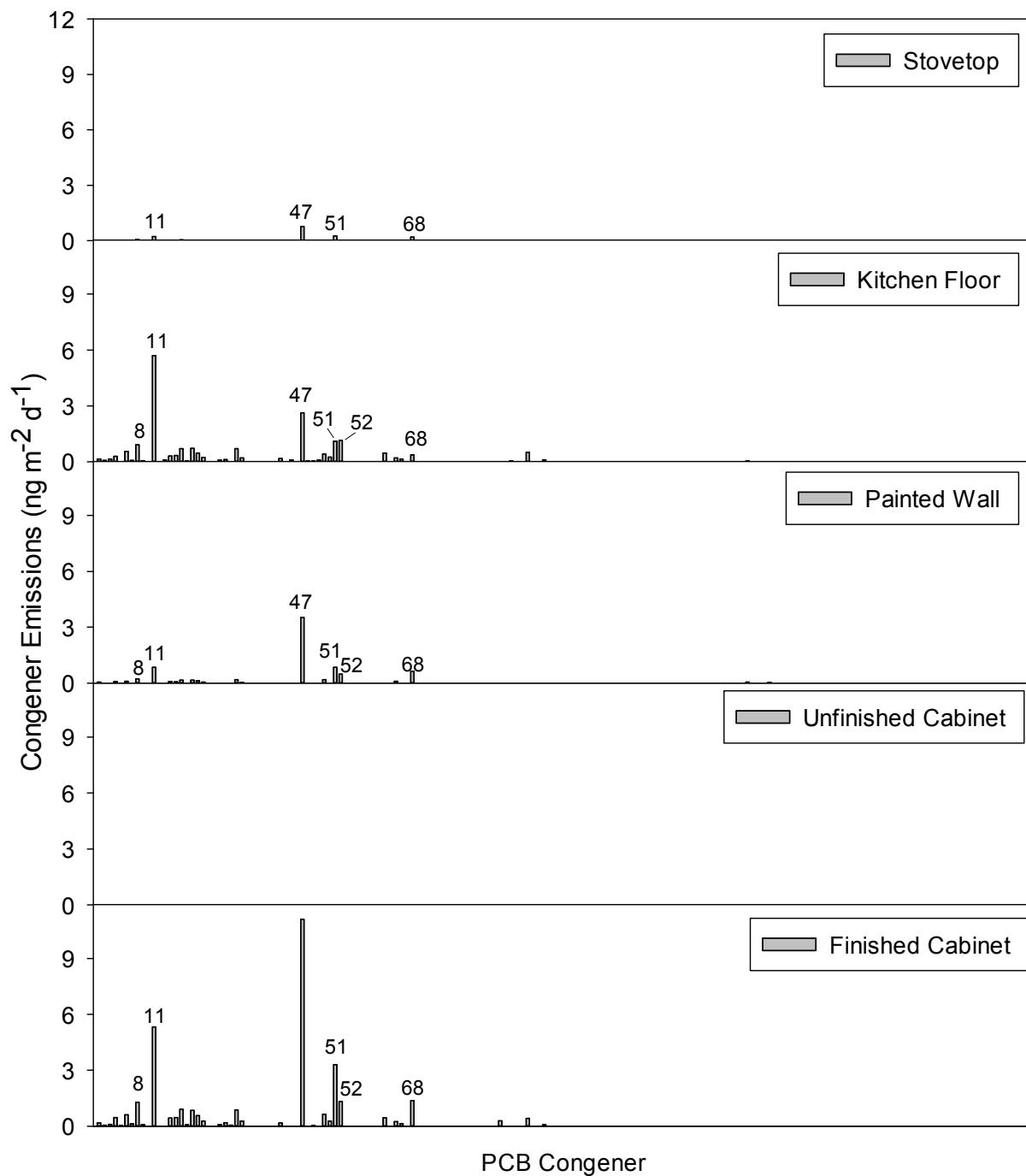


Figure S6: Average ($n=2$) surface emissions ($\text{ng m}^{-2} \text{ d}^{-1}$) for all 209 PCB congeners.

198/199	3.49	2.69	1.70	1.64	0.51	0.99	3.52	3.14	2.02
200	0.94	0.62	<LOQ	0.33	0.27	0.27	0.98	0.33	0.20
201	0.75	0.51	0.43	0.43	0.15	0.25	1.50	0.51	0.33
202	1.87	1.28	1.03	1.15	0.64	0.64	3.16	0.99	0.83
203	2.79	1.65	0.93	1.07	0.18	0.60	2.16	1.90	1.27
205	<LOQ								
206	1.71	0.75	0.85	0.63	<LOQ	0.49	0.78	0.89	0.77
207	0.68	0.37	0.32	<LOQ	<LOQ	0.27	0.34	0.29	0.25
208	0.93	0.35	0.27	0.26	<LOQ	0.22	0.63	0.48	0.27
209	<LOQ								

201	0.15	0.19	0.44	1.77	0.92	0.59	1.13	0.54
202	0.68	0.62	0.91	4.45	2.11	1.44	2.31	1.22
203	0.49	0.55	0.36	3.51	1.94	1.94	2.74	0.94
205	<LOQ							
206	0.50	<LOQ	0.27	0.70	0.99	0.84	0.95	<LOQ
207	<LOQ	<LOQ	0.14	0.39	0.45	0.26	0.45	0.29
208	0.18	<LOQ	0.14	0.61	0.47	0.34	0.52	0.24
209	<LOQ	<LOQ	<LOQ	<LOQ	1.77	<LOQ	<LOQ	<LOQ

196	0.14	0.38	0.07	0.16	0.26	0.18	0.12	0.37	0.11	0.16	0.17	0.09
197	<LOQ	0.14	<LOQ									
198/199	0.44	0.84	0.27	0.39	0.51	0.43	0.43	0.89	0.39	0.42	0.50	0.44
200	<LOQ	0.15	<LOQ	0.15	<LOQ	<LOQ	0.07	0.14	<LOQ	<LOQ	<LOQ	<LOQ
201	0.11	0.23	0.06	0.09	0.08	0.11	0.09	0.08	0.06	0.10	0.15	0.07
202	0.33	0.40	0.32	0.33	0.27	0.31	0.39	0.36	0.24	0.41	0.44	0.30
203	0.27	0.34	0.21	0.33	0.45	0.28	0.26	0.57	0.15	0.33	0.48	0.07
205	<LOQ	0.44	<LOQ									
206	0.31	0.47	<LOQ	0.27	0.43	0.28	0.30	0.56	0.18	0.22	0.21	<LOQ
207	<LOQ	0.41	<LOQ	0.11	0.18	0.13	0.11	0.12	0.06	0.13	0.16	<LOQ
208	0.10	0.42	<LOQ	0.10	0.14	0.11	0.09	0.17	0.11	0.10	0.10	<LOQ
209	<LOQ	1.09	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.79	<LOQ	0.72	0.75	<LOQ

200	<LOQ										
201	0.11	<LOQ									
202	0.68	<LOQ									
203	0.60	<LOQ									
205	<LOQ										
206	0.39	<LOQ									
207	<LOQ										
208	0.25	<LOQ									
209	<LOQ										