Supplementary Material

Firefighter hood contamination: Efficiency of laundering to remove PAHs and FRs

Keywords: Firefighters; flame retardants; hoods; laundering; PAHs; PBDEs,

Table SI: Contamination levels of individual PAHs (ng/g) in routinely laundered hoods vs. unlaundered hoods after 4 residential fire responses[A]

	Unlaundered hoods (n=5)			Routinely laundered hoods (n=5)			
Compound[B] (IARC[C])	No. above LOD[D]	Mean	Standard deviation	No. above LOD	Mean	Standard deviation	Mean difference (%)
Benzo(a)anthracene (2B)	5	362	283	0	45.2	0.0	-87.5
Benzo(a)pyrene (1)	5	488	361	0	45.2	0.0	-90.7
Benzo(b)fluoranthene (2B)	5	626	450	0	45.2	0.0	-92.8
Benzo(g,h,i)perylene (3)	5	484	353	0	70.7	0.0	-85.4
Benzo(k)fluoranthene (2B)	5	219	147	0	6.40	0.0	-97.1
Chrysene (2B)	5	466	471	0	45.2	0.0	-90.3
Dibenzo(a,h)anthracene (2A)	5	2,360	1,430	1	105	75.7	-95.6
Fluoranthene (3)	5	1,132	746	5	216	47.7	-80.9
Indeno(1,2,3-cd)pyrene (2B)	5	482	318	0	70.7	0.0	-85.3
Phenanthrene (3)	5	196	102	5	446	115	128
Pyrene (3)	5	286	305	2	77.8	13.4	-72.8
Total PAHs[E]	73%	7,280	4,920	20%	1,370	109	-81.2

A. In calculating summary statistics, non-detectable levels were assigned values by taking the limit of detection divided by the square root of 2.

B. Anthracene (IARC=3, 78.0 ng/g) and fluorene (IARC=3, 80.0 ng/g) were detected in one routinely laundered hood and no unlaundered hoods. Acenaphthene (IARC=3) and naphthalene (IARC=2B) were not detected in any hoods.

C. IARC classification categories: 1= Carcinogenic to humans, 2A=Probably carcinogenic to humans, 2B=Possibly carcinogenic to humans, 3=Not classifiable as to its carcinogenicity to humans[(26)]

D. Limit of detection (LOD) for PAHs ranged from 9 – 100 ng/g.

E. Total PAH summary statistics include PAHs not shown in table (anthracene, fluorene, acenaphthene, and naphthalene).

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Table SII: Contamination levels of individual PBDEs (ng/g) in routinely laundered hoods vs. unlaundered hoods after 4 residential fire responses [A]

	Unlaundered hoods (n=5)			Routinely laundered hoods (n=5)			
Compound [B]	No. above LOD[C]	Mean	Standard deviation	No. above LOD	Mean	Standard deviation	Mean difference (%)
BDE-47	5	11.9	5.08	5	22.2	15.2	87.1
BDE-99	5	22.9	4.86	5	34.4	14.1	50.3
BDE-153	4	7.44	5.82	5	5.48	3.59	-26.4
BDE-206	5	25.5	15.9	5	32.8	12.5	28.6
BDE-209	5	944	964	5	1,350	520	43.1
Total PBDEs[D]	53%	1,020	967	58%	1,450	520	42.9

A. In calculating summary statistics, non-detectable levels were assigned values by taking the limit of detection divided by the square root of 2.

B. BDE-100 (14 ng/g) detected in only one laundered hood and no unlaundered hoods. BDE-85, BDE-154, and BDE-183 were not detected in any hoods.

C. Limit of detection (LOD) for all PBDEs was 2 ng/g.

D. Total PBDE summary statistics include PBDEs not shown in table (BDE-85, BDE-100, BDE-154, and BDE-183).

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Table SIII: Contamination levels of individual NPBFRs (ng/g) in routinely laundered hoods vs. unlaundered hoods after 4 residential fire responses[A]

	Unlaundered hoods (n=5)			Routinely Laundered hoods (n=5)			
Compound[B]	No. above LOD[C]	Mean	Standard deviation	No. above LOD	Mean	Standard deviation	Mean difference (%)
TBB	5	30.6	27.1	3	5.89	9.25	-80.8
TBPH	4	12.2	10.2	1	2.66	2.98	-78.2
DBDPE	4	97.8	61.4	3	38.9	67.3	-60.3
TBBPA	4	16.6	20.6	1	3.01	3.37	-81.8
Total NPBFRs[D]	43%	163	112	20%	55.7	82.8	-65.7

A. In calculating summary statistics, non-detectable levels were assigned values by taking the limit of detection divided by the square root of 2.
B. Not detected in any hoods: BTBPE and HBCD.
C. Limit of detection for all NPBFRs was 2 ng/g.
D. Total NPBFR summary statistics include NPBFRs not shown in table (BTBPE and HBCD).

Table SIV: Contamination levels of individual OPFRs (ng/g) in routinely laundered hoods vs. unlaundered hoods after 4 residential fire responses[A]

	Unlaundered hoods (n=5)			Routinely Laundered hoods (n=5)			
Compound[B]	No. above LOD[C]	Mean	Standard deviation	No. above LOD	Mean	Standard deviation	Mean Difference (%)
TCPP	1	2.04	1.27	1	3.39	4.22	66.3
TDCPP	5	68.3	64.4	5	20.4	12.1	-70.2
TCP	5	93.3	61.7	5	36.7	42.0	-60.6
TPP	5	338	277	5	158	46.8	-53.3
Total OPFRs[D]	64%	504	372	64%	220	103	-56.3

A. In calculating summary statistics, non-detectable levels were assigned values by taking the limit of detection divided by the square root of 2.
B. Not detected in any hoods: TCEP.
C. Limit of detection for all OPFRs was 2 ng/g.
D. Total OPFR summary statistics include OPFRs not shown in table (TCEP).

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Table SV. Concentrations of flame retardants (ug/g)* in bulk samples of the burn room furnishings

Compound measured	Carpet padding (n = 3)	Curtain liner (n = 1)	Inner spring mattress foam (n = 2)	Foam topper for bed (n = 2)	Head-board padding (n = 1)	Chair cushion (n = 2)	Chair cushion liner (n = 1)	Flat screen TV plastic (n = 1)
Polybrominated diphenyl ethers								
BDE 47	< 0.1 - 0.41	0.19	< 0.1	< 0.1 - 0.74	5,600	< 0.1 - 4.1	< 0.1	< 0.1
BDE 85	< 0.1	< 0.1	< 0.1	< 0.1	840	< 0.1 - 1.6	< 0.1	< 0.1
BDE 99	0.11 - 0.56	0.25	< 0.1 - 0.44	< 0.1 - 2.9	15,000	< 0.1 - 25	< 0.1	< 0.1
BDE 100	< 0.1	< 0.1	< 0.1	< 0.1 - 0.6	2,500	< 0.1 - 3.8	< 0.1	< 0.1
BDE 153	< 0.1 - 5.6	< 0.1	< 0.1	< 0.1 - 2.0	2,000	< 0.1 - 13	< 0.1	< 0.1
BDE 154	< 0.1	< 0.1	< 0.1	< 0.1 - 0.69	1,400	< 0.1 - 5.0	< 0.1	< 0.1
BDE 183	< 0.1 - 1.1	< 0.1	< 0.1	< 0.1 - 2.0	67	< 0.1	< 0.1	< 0.1
BDE 206	< 0.1 - 14	2.8	< 0.1 - 6.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
BDE 209	0.41 - 102	440	< 0.1 - 61	< 0.1	< 0.1	< 0.1 - 0.68	< 0.1	< 0.1
Other brominated flame retardants								
TBBPA	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TBB	0.38 - 3.2	910	< 0.1 - 0.5	< 0.1 - 7.5	< 0.1	18,500 - 26,750	68.5	< 0.1
TBPH	0.22 - 5.7	340	< 0.1 - 1.2	< 0.1 - 3.7	< 0.1	5,800 - 6,380	19.6	< 0.1
DBDPE	< 0.1 - 0.53	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phosphorylated flame retardants								
TCEP	< 0.1	1.4	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TCPP	59 - 630	5.4	< 0.1	< 0.1	8.4	< 0.1 - 1.3	< 0.1	< 0.1
TDCPP	240 - 9,100	1.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPP	0.43 - 3.8	4.0	0.16 - 0.23	< 0.1 - 1.3	1,690	1,400 - 7,380	22.6	19
TCP	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

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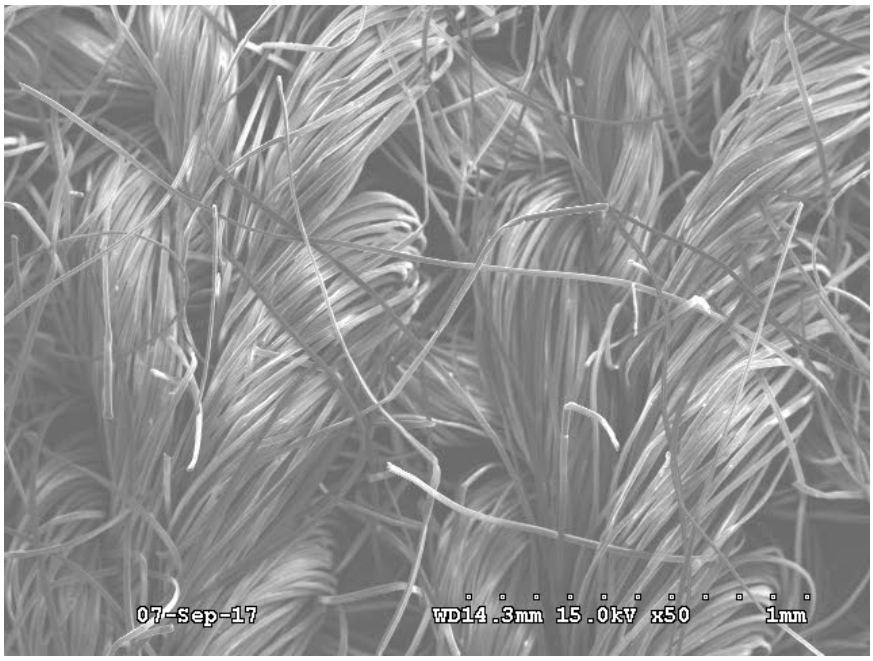

Figure S1: New Hood Microscopy

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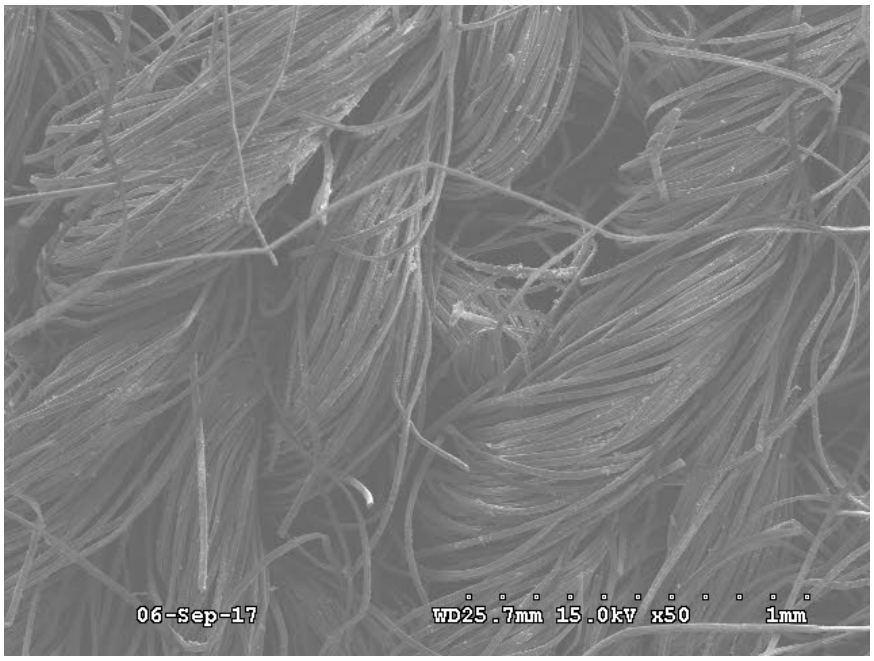

Figure S2: Unlaundered Exposed Hood Microscopy

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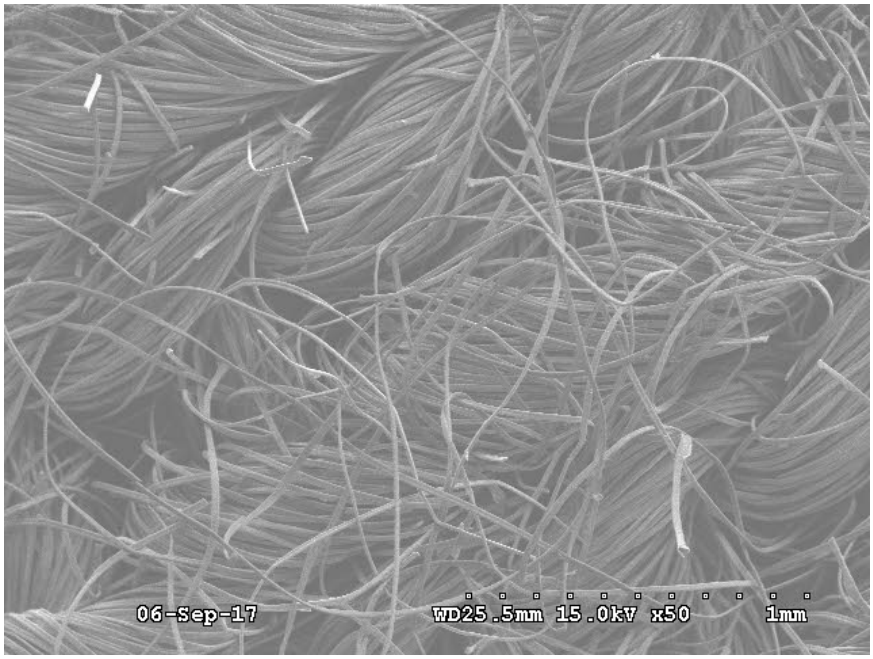

Figure S3: Exposed Laundered 4 Times Hood Microscopy