

Commonweal Biomonitoring Resource Center
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I, Sharyle Patton, am writing this statement in support of the Petition to the CPSC to regulate four categories of household products containing non-polymeric additive organohalogen flame retardants.

1. I am the director of the Commonweal Environmental Health Program in Bolinas, California, which takes a science-based approach to the challenge of reducing anthropogenic environmental contaminants. I also direct the Commonweal Biomonitoring Resource Center, and have worked with government agencies and community groups nationally and internationally to design and implement biomonitoring projects to inform improved chemicals regulation, focus chemicals research, and raise public awareness. Additionally, I am director of special projects for the Collaborative on Health and Environment (CHE), a Commonweal-sponsored network that seeks to raise the level of awareness about possible linkages between environmental threat and health outcomes. I was previously the northern co-chair of the International Persistent Organic Pollutants (POPs) Elimination Network, a network of over 350 international non-governmental organizations that worked successfully towards the UN Treaty on POPs, signed in May 2001. Please see my biographical sketch attached.

2. For the past 8 years, I have been involved with numerous biomonitoring studies, including a study in collaboration with the Center for Disease Control (CDC) and California Public Health Department to measure levels of perchlorate in humans, water and produce in Southern California, a study that measured levels of neurotoxins in a group of individuals heading up national groups concerned with learning and developmental disabilities, and a methods development study in collaboration with the International Association of Firefighters that tested 35 firefighters in 15 states for levels of combustion bioproducts and flame retardants. I am currently a founding member of the Women Firefighter Biomonitoring Collaborative, (WFBC), a team of scientists and firefighter groups and advocacy groups which has been awarded a three year grant from the California Breast Cancer Research Foundation to assess women firefighters' exposure to chemicals linked to breast cancer, including carcinogens and endocrine disruptors such as combustion products and diesel exhaust, flame retardants, and perfluorinated chemicals. I am Co-chair of the Women Firefighter Biomonitoring Collaborative's communication, education, and policy team, and have recently co-written a paper discussing effecting biomonitoring study results communication¹.

3. Firefighters are exposed on the job, particularly during fire cleanup and overhaul, to organohalogen flame retardants contained in consumer products, and to their toxic

combustion products. The latter include dioxins and furans², which are likely contributors to the observed high levels of cancer (such as myeloma, lymphoma, and testicular and bladder cancers) in acting and retired firefighters³.

4. Several studies have found that firefighters have higher levels of organohalogen flame retardants and dioxins and furans than the average population. In collaboration with the University of California Irvine's Center for Occupational and Environmental Health and a Southern California fire department, Biomonitoring California carried out a study of environmental chemical exposures in 101 firefighters in Southern California in 2010-2011, known as the Firefighter Occupational Exposures (FOX) Project⁴. The study detected five PBDE (polybrominated diphenyl ether) congeners in over 90% of the study population, indicating widespread exposure. Two of these highly detected congeners, BDE-47 and BDE-99, are the most abundant congeners used in the commercial flame retardant mixture pentaBDE, which was added to foam inside upholstered furniture in California for many years. A 2013 study by Shaw *et al.*⁵ also measured the blood levels of several flame retardants, including the organohalogen flame retardants PBDEs, in 12 firefighters following a fire event. Study participants had elevated concentrations of PBDEs, particularly the PBDE-209 congener. The authors suggested that this high concentration of PBDE-209 may be due to inhalation of deca-BDE-containing particulate in smoke and dust that is released from burning consumer products such as televisions. Shaw *et al.*⁶ also found distinctive patterns of dioxin and furan congeners in the blood of these 12 firefighters, suggesting occupational exposure.

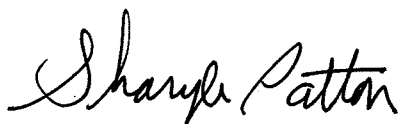
5. Since 2002, 56 percent of firefighters in the International Association of Fire Fighters Cancer and Occupational Disease Database who have died in the line of duty have died of occupation cancers (unpublished confidential data). This is the largest health-related issue facing the fire fighting profession. Firefighters have higher incidence of several forms of cancer, which may be at least in part related to their exposure to organohalogen flame retardants and their combustion products such as halogenated dioxins and furans⁷. A recent NIOSH study⁸, in collaboration with the National Cancer Institute and the Department of Public Health Sciences at the University of California at Davis, analyzed cancers and cancer deaths through 2009 among 29,993 firefighters from the Chicago, Philadelphia and San Francisco fire departments who were employed since 1950, and found higher rates of respiratory, digestive and urinary systems cancers compared to the general population. Bates *et al.*⁹ found that California firefighters are disproportionately susceptible to testicular cancer, melanoma, brain cancer, or esophageal cancer. Ma *et al.*¹⁰ found that Florida firefighters may get bladder, testicular, or thyroid cancer. Baris *et al.*¹¹ found that Philadelphia firefighters had increased mortality from colon cancer, kidney cancer, non-Hodgkin's lymphoma, or multiple myeloma. A 2006 study by Youakim¹² found firefighters with long-term service had an increased risk for colon cancer, kidney cancer, brain cancer, leukemia, and bladder

cancer. Kang *et al.*¹³ found increased incidence of colon and brain cancer in Massachusetts firefighters. LeMasters *et al.*¹⁴ reviewed 32 published studies and concluded that, overall, the risk of multiple myelomas, non-Hodgkin's lymphoma, testicular cancer, and prostate cancer for firefighters was notable. As firefighters are not required to regularly handle industrial chemicals, a probable reason for elevated incidences of such cancers is due to occupational exposure of firefighters to carcinogens such as certain organohalogen flame retardants, dioxins and furans, polycyclic aromatic hydrocarbons (PAHs) and others.

6. Firefighters save lives, but they are more likely to get sick or be killed on the job than the average Americans¹⁵. Organohalogen flame retardants and their combustion products are some of the potentially carcinogenic compounds that firefighters become exposed to on the job at higher levels than the general population. As such, deaths could potentially be avoided by banning, or at least restricting, the use of the entire class of organohalogen flame retardants in household products. Given that organohalogen flame retardants in furniture, mattresses, children's products and electronics casings as currently used do not stop fires, but increase the risk of cancer for firefighters, I see no justification for their use, and fully support the accompanying petition.

Yours sincerely,

Sharyle Patton



¹ Brody JG, Dunagan SC, Morello-Frosch R, Brown P, Patton S, Rudel RA. Reporting individual results for biomonitoring and environmental exposures: lessons learned from environmental communication case studies. *Environ Health* **13**(40). doi: 10.1186/1476-069X-13-40.

² Shin-ichi Sakai S, Watanab J, Honda Y, Takatsuki H, Aoki I, Futamatsu M, Shiozaki K. Combustion of brominated flame retardants and behavior of its products. *Chemosphere* **42**(5-7), 519-31 (2001).

³ LeMasters GK, Genaidy AM, Succop P, Deddens J, Sobeih T, Barriera-Viruet H, Dunning K, Lockey J. Cancer Risk Among Firefighters: A Review and Meta-Analysis of 32 Studies, *J Occup Environ Med* **48**, 1189-202 (2006).

⁴ <http://biomonitoring.ca.gov/projects/firefighter-occupational-exposures-fox-project>

⁵ Shaw SD, Berger ML, Harris JH, Yun SH, Wu Q, Liao C, Blum A, Stefani A, Kannan K. Persistent organic pollutants including polychlorinated and polybrominated dibenzo-p-dioxins and dibenzofurans in firefighters from Northern California. *Chemosphere* **91**(10), 1386-94 (2013). doi: 10.1016/j.chemosphere.2012.12.070.

⁶ Shaw SD, Berger ML, Harris JH, Yun SH, Wu Q, Liao C, Blum A, Stefani A, Kannan K. Persistent organic pollutants including polychlorinated and polybrominated dibenzo-p-dioxins and dibenzofurans in firefighters from Northern California. *Chemosphere* **91**(10), 1386-94 (2013). doi: 10.1016/j.chemosphere.2012.12.070.

- ⁷ Edelman P, Osterloh J, Pirkle J, Caudill SP, Grainger J, Jones R, Blount B, Calafat A, Turner W, Feldman D, Baron S, Bernard B, Lushniak BD, Kelly K, Prezant D. Biomonitoring of Chemical Exposure among New York City Firefighters Responding to the World Trade Center Fire and Collapse, *Environ Health Perspect* **111**, 1906-11 (2003).
- ⁸ Daniels RD, Kubale TL, Yiin JH, Dahm MM, Hales TR, Baris D, Zahm SH, Beasumont JJ, Waters KM, Pinkerton L E. Mortality and cancer incidence in a pooled cohort of US firefighters from San Francisco, Chicago and Philadelphia (1950-2009), *Occup Environ Med*, doi:10.1136/oemed-2013-101662.
- ⁹ Bates MN. Registry-Based Case-control Study of Cancer in California Firefighters, *Am J Ind Med* **50**(5), 339-44 (2007).
- ¹⁰ Ma F, Fleming LE, Lee DJ, Trapido E, Gerace TA. Cancer Incidence in Florida Professional Firefighters, 1981 to 1999, *J Occup Environ Med* **48**, 883-8 (2006).
- ¹¹ Baris D, Garrity TJ, Telles JL, Heineman EF, Olshan A, Zahm SH. Cohort Mortality Study of Philadelphia Firefighters, *Am J Ind Med* **39**, 463-76 (2001).
- ¹² Youakim S. Risk of Cancer Among Firefighters: A Quantitative Review of Selected Malignancies, *Arch Environ Occup Health* **61**(5), 223-31 (2006).
- ¹³ Kang D, Davis LK, Hunt P, Kriebel D. Cancer Incidence Among Male Massachusetts Firefighters, 1987-2003, *Am J Ind Med* **51**, 329-35 (2008).
- ¹⁴ LeMasters GK, Genaidy AM, Succop P, Deddens J, Sobeih T, Barriera-Viruet H, Dunning K, Lockey J. Cancer Risk Among Firefighters: A Review and Meta-Analysis of 32 Studies, *J Occup Environ Med* **48**, 1189-202 (2006).
- ¹⁵ Clarke C, Zak M. Bureau of Labor Statistics. Fatalities to Law Enforcement Officers and Firefighters, 1992-97. Available at: <http://www.bis.gov/lif/oshwc/cfar0029.txt>