Flame Retardants in the Bay: After the PBDE Ban

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RMP: Scanning the Horizon

Photo: Plus M Productions
Why add flame retardants?

To meet California Bureau of Home Furnishings flammability standards

PBDEs added to foam, plastics, fabrics
Tiered Risk Framework

PBDEs

High Concern
- moderate or high impact

Moderate Concern
- low impact

Low Concern
- limited impact

Possible Concern
- uncertainty as to impact
PBDE Bans & Phase-outs

US phase-out 2004, California ban 2006

US phase-out 2013
PBDE Recovery: Low Concern for the Bay

- Declining Penta congener (BDE-47)
Flame Retardant Problem Persists

Manufacturers replace PBDEs with Alternative Flame Retardants
2014 Screening for Alternative Flame Retardants

PBDEs and 3 classes of alternatives
- Bromine
- Chlorine
- Phosphate

Sutton et al. accepted: Science of the Total Environment
Higher Levels of Phosphates in Bay Waters

TCPP (46-2,900)
TBEP (24-1,000)
TDCPP (14-450)
TPhP (41-360)
TCEP (7-300)
nanograms per liter
semi-quantitative

Marine aquatic toxicity thresholds PNECs:
20 ng/L
370 ng/L
2017 Screening for Phosphate Flame Retardants in Water

Marine aquatic toxicity thresholds PNECs:

- TCPP (15-150) nanograms per liter
- TBEP (0.4-63)
- TDCPP (3-23)
- TPhP (3-63)
- TCEP (4-19)

Semi-quantitative

20 ng/L
370 ng/L
TDCPP or Chlorinated Tris

450 ng/L

Phosphates higher with drought

SF Bay 2017  SF Bay 2013  Germany 2010  Japan 2009

PNEC
Endocrine Disruption: Combined Impacts?

TDCPP

TCPP

TCEP
Risks of Phosphate Flame Retardants?

- High Concern: moderate or high impact
- Moderate Concern: low impact
- Low Concern: limited impact
- Possible Concern: uncertainty as to impact
From Consumer Products to the Bay

Dr. Heather Stapleton
Duke University

Dr. Miriam Diamond
University of Toronto
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Off-gas
Data Gap: Stormwater

Solution: 2019 CECs Screening

Pilot Phase of Multi-Year Effort

Alternative Flame Retardants in San Francisco Bay: Synthesis and Strategy
How Do We Manage Flame Retardants?

Past flammability standards do not improve safety.
Flame Retardants: Changing the Rules

California Bureau of Home Furnishings

- TB117-2013: New standard for foam furniture, exemptions for baby products
- SB 1019: Furniture labeling law
Banning Flame Retardants (not just PBDEs)

- San Francisco Ordinance - 2017

Sept 29th, 2018: Gov. Brown signs AB 2998
The story is not over yet...

• More types of products

• More flammability standards

• Other uses for phosphates
RMP Science Informs Policy