Delaware River Basin Commission

Contaminants of Emerging Concern in the Delaware River Basin

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CCNJ Spring Conference
May 3, 2016
Why was the DRBC created in 1961?

- Water supply shortages and disputes over the apportionment of the basin’s waters;
- Severe pollution in the Delaware River and its major tributaries;
- Serious flooding

The 1937 Philadelphia Record editorial page cartoon depicts the time when the tidal Delaware was an open sewer, where pollution in some stretches robbed the river of all its oxygen needed to support fish and other aquatic life.

Current Water Quality Concerns
Why are Pharmaceuticals and Personal Care Products (PPCP) of concern?

- Biological effects (diclofenac, triclocarban)
- Resistant to degradation (carbamazapine)
- Widespread and increasing use (ibuprofen, metformin)
- Wastewater treatment plants are not designed to remove (trimethoprim, erythromycin)
- Effects on aquatic life (hormone EE2)
Fifteen Priority PPCP in Tidal Delaware River

- Codeine
- Metformin
- Thiabendazole
- 2-Hydroxy-ibuprofen
- Triclocarban
- Fluoxetine
- Dehydronifedipine
- Clarithromycin
- Lincomycin
- Ibuprofen
- Gemfibrozil
- Carbamazepine
- Sulfamethoxazole
- Erythromycin-H2O

> RM 95 = Source Water

mouth of bay to head of tide
Polybrominated Diphenyl Ethers (PBDE) Flame Retardants

* Used in consumer products such as television casings and polyurethane foam inside furniture cushions.
* **Indoor dust** is believed to be the primary source of human exposure (~ 90%) but **dietary exposure** is also a concern.
* PBDEs are characterized as persistent, bioaccumulative, toxic compounds.
* High PBDE levels in serum alter steroid hormones levels and thyroid function, motor and cognitive deficits in children.
Polybrominated Diphenyl Ethers (PBDE) Flame Retardants

Lipid normalized tissue concentrations of BDE 209 in catfish and perch by year sampled
Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)

- Properties
- Uses
- Sources
- Stewardship
- Alternatives
- Discharges
- Persistence
- Toxicity
- Bioaccumulation
- Sinks
Surface Water Samples
Six sites in 2007, 2008, 2009
Fifteen sites in 2015
Perfluoroalkyl Carboxylic Acids (PFCAs) In Ambient Waters Of The Tidal Delaware River 2009

PFNA C9

River Miles

mouth of bay

head of tide

ng/L
* Sites sampled in 2007 and 2015
Fish Sampling Locations 2004 - 2015

Non-Tidal Locations
- Narrowsburg, NY RM 290
- Milford, PA RM 246
- Easton, PA RM 183
- Lambertville, NJ RM 149

Tidal Locations
- Crosswicks Creek RM 128
- Tacony-Palymra Br. RM 107
- Woodbury Creek RM 91
- Raccoon Creek RM 80
- Salem River RM 58
PFUnA (C11) in White Perch from Delaware Estuary

EDL < 2.5 ng/g in 2004 to 2010
EDL < 0.5 ng/g in 2012

ng/g fish fillet

sampling year


RM 58
RM 80
RM 91
RM 107
RM 128

Tidal
PFOS (C8) in Smallmouth Bass from Delaware River

MDH fish consumption advisory
1 meal/wk >40 ng/g

ng/g fish fillet

sampling year


RM 289
RM 246
RM 183
RM 149
Current assessment and regulatory approaches are inadequate for many compounds detected in waters.

Some CEC may require regulation under the SDWA and CWA.

Additional ecotoxicology information is needed for assessment of aquatic life and wildlife protection.