Emerging Compound Periodic Testing Effort by Fairfax Water

Quarterly Data for 2008/2009/2010 (updated 03/27/12)

There are tens of thousands of compounds emerging that are considered suspected Endocrine Disrupting Compounds or Pharmaceuticals and Personal Care Products. Fairfax Water carefully considered the most prudent use of its resources in researching a suitable list of compounds to test in both source and treated waters. We looked at influences in the Potomac and Occoquan River Watersheds (industrial, agricultural uses, etc.) to determine which compounds are most likely to be present. We then looked at our treatment process to determine which compounds would not be readily removed through treatment. Finally, we looked at which compounds could be measured in water. The list of compounds in the tables below were tested in the source and treated waters. Samples were sent to an independent laboratory proficient in this type of analysis.

Table 1

Source Waters (Water from the Potomac River or Occoquan Reservoir prior to any chemical or physical treatment application)

Compounds	Common Use of Compound	Lowest level of instrument detection[1]	Occoquan Reservoir Data											Potomac River Data											# of 8 oz glasses of Treated drinking water per day ingested before exceeding Acceptable Daily Intake (ADI) Levels*
			Jun-08 [2]	Sep-08	Dec-08	Mar-09 [3]	Jun-09 [3]	Sep-09 [3]	Dec-09 [3]	Mar-10 [3]	Jun-10 [3]	Sep-10 [2 & 3]	Dec-10 [2 & 3]	Jun-08 [2]	Sep-08	Dec-08	Mar-09 [3]	Jun-09 [3]	Sep-09 [3]	Dec-09 [3]	Mar-10 [3]	Jun-10 [3]	Sep-10 [2 & 3]	Dec-10 [2 & 3]	
Atrazine	Commonly used herbicide for maize crops	0.1 ppb	**0.9 ppb**	ND	ND	ND	**0.7 ppb**	**0.2 ppb**	ND	ND	**0.4 ppb**	**0.1 ppb**	ND	ND	ND	ND	ND	**0.2 ppb**	**0.2 ppb**	ND	ND	**0.9 ppb**	ND	ND	25 glasses at a 1.0 ppb concentration [4]
Carbamazepine	Anti-epileptic drug	0.001 ppb	**0.003 ppb**	**0.002 ppb**	**0.011 ppb**	**0.012 ppb**	**0.002 ppb**	**0.009 ppb**	**0.007 ppb**	**0.001ppb**	**0.004 ppb**	**0.006 ppb**	**0.009ppb**	**0.006 ppb**	**0.007 ppb**	**0.004 ppb**	**0.007 ppb**	**0.003 ppb**	**0.003 ppb**	**0.006 ppb**	**0.002 ppb**	**0.007 ppb**	**0.023 ppb**	**0.008 ppb**	5600 glasses at a 0.018 ppb concentration [4]
Estrone	Natural human hormone	0.5 ppt	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.9 ppt**	**0.7 ppt**	ND	ND	ND	ND	ND	ND	ND	ND	ND	4300 glasses at a 0.9 ppt concentration [4]
Caffeine	Stimulant	0.05 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.06 ppb**	**0.07 ppb**	ND	ND	ND	ND	ND	ND	ND	740,000 glasses at a 1.0 ppb concentration [4]
Naproxen	Anti-inflammatory pharmaceutical	0.002 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.003 ppb**	ND	ND	ND	ND	>340,000,000 glasses at a <0.00050 ppb concentration [4]
Progesterone	Natural human hormone	0.1 ppt	NA	NA	**0.1 ppt**	**0.1 ppt**	ND	ND	ND	ND	ND	ND	ND	NA	NA	**0.1 ppt**	**0.2 ppt**	**0.1 ppt**	**0.1 ppt**	ND	**0.3 ppt**	**0.1 ppt**	ND	ND	1,500 glasses at a 199.0 ppt concentration [4]
Sulfamethoxazole [6]	Antibacterial antibiotic	0.002 ppb	ND	ND	ND	ND	ND	ND	**0.014 ppb**	**0.003 ppb**	**0.005 ppb**	**0.008 ppb**	**0.020 ppb**	ND	ND	ND	**0.004 ppb**	ND	ND	**0.027 ppb**	**0.003 ppb**	**0.020 ppb**	**0.060 ppb**	**0.019 ppb**	51,000,000 glasses at a 0.003 ppb concentration [4]
17b-estradiol	Natural human hormone	0.5 ppt	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Bisphenol A	Intermediate in manufacture of plastics and resins	0.010 ppb	ND	ND	ND	ND	ND	ND	ND	ND	**0.027ppb**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	60,000 glasses at a 0.025 ppb concentration [4]
Butylbenzyl phthalate	Plasticizer	1.0 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
DEHP [di(2-ethylhexyl)phthalate]	Plasticizer	0.6 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Dibutyl phthalate	Plasticizer	2.0 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Ethynyl estradiol	Synthetic estrogenic pharmaceutical	0.5 ppt	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Ibuprofen	Anti-inflammatory pharmaceutical	0.05 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Lindane (BHC-gamma)	Insecticide	0.02 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Linuron	Herbicide	0.5 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Methoxychlor	Pesticide	0.1 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Monensin	Antibiotic	0.0001 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Nonylphenol	Used as an intermediate in manufacture of chemicals	0.5 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Octylphenol	Used as an intermediate in manufacture of chemicals	0.5 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

***Acceptable Daily Intake or ADI** is a measure of the amount of a specific substance in food or drinking water that can be ingested orally over a lifetime without an appreciable health risk.

Table 2

Treated Waters (Water which has been physically and chemically treated to drinking water quality)

Compounds	Common Use of Compound	Lowest level of instrument detection[1]	Griffith Treatment Plant Data											Corbalis Treatment Plant Data											# of 8 oz glasses of Treated drinking water per day ingested before exceeding Acceptable Daily Intake (ADI) Levels*
			Jun-08 [2]	Sep-08	Dec-08	Mar-09 [3]	Jun-09 [3]	Sep-09 [3]	Dec-09 [3]	Mar-10 [3]	Jun-10 [3]	Sep-10 [2 & 3]	Dec-10 [2 & 3]	Jun-08 [2]	Sep-08	Dec-08	Mar-09 [3]	Jun-09 [3]	Sep-09 [3]	Dec-09 [3]	Mar-10 [3]	Jun-10 [3]	Sep-10 [2 & 3]	Dec-10 [2 & 3]	
Atrazine [5]	Commonly used herbicide for maize crops	0.1 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Carbamazepine	Anti-epileptic drug	0.001 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Estrone	Natural human hormone	0.5 ppt	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Caffeine	Stimulant	0.05 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Naproxen	Anti-inflammatory pharmaceutical	0.002 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.003 ppb**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	>340,000,000 glasses at a <0.00050 ppb concentration [4]
Progesterone	Natural human hormone	0.1 ppt	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Sulfamethoxazole [6]	Antibacterial antibiotic	0.002 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.006 ppb**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.001 ppb**	51,000,000 glasses at a 0.003 ppb concentration [4]
17b-estradiol	Natural human hormone	0.5 ppt	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Bisphenol A	Intermediate in manufacture of plastics and resins	0.010 ppb	ND	ND	ND	ND	ND	ND	ND	ND	**0.025 ppb**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	600,000 glasses at a 0.025 ppb concentration [4]
Butylbenzyl phthalate	Plasticizer	1.0 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
DEHP [di(2-ethylhexyl)phthalate]	Plasticizer	0.6 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Dibutyl phthalate	Plasticizer	2.0 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Ethynyl estradiol	Synthetic estrogenic pharmaceutical	0.5 ppt	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Ibuprofen	Anti-inflammatory pharmaceutical	0.05 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Lindane (BHC-gamma)	Insecticide	0.02 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Linuron	Herbicide	0.5 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Methoxychlor	Pesticide	0.1 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Monensin	Antibiotic	0.0001 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Nonylphenol	Used as an intermediate in manufacture of chemicals	0.5 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Octylphenol	Used as an intermediate in manufacture of chemicals	0.5 ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

***Acceptable Daily Intake or ADI** is a measure of the amount of a specific substance in food or drinking water that can be ingested orally over a lifetime without an appreciable health risk.

Key to terms: ND = Non-Detect NA = not analyzed during this collection ppb = part per bill ppt = part per tppt = part per trillion

[1] Lowest Level of Instrument Detection is the concentration at which the compound cannot be enumerated lower than, and thus the result termed a Non-Detect (ND).

[2] The Instrument Lower Level of Detection for this date for Bisphenol A was 0.1 ppb.

[3] The Instrument Lower Level of Detection for this specific date for Monensin was 0.001

[4] Source of information obtained from a review of ADI's and correlated data by Intertox, Inc. April 2009; and the Water Research Foundation 2008 Publication 91238, *Toxicological Relevance of EDC's and Pharmaceuticals in Drinking Water*

[5]Atrazine has been detected periodically within regulatory data sets at extremely low levels below the Instrument Detection Level in the above tables. These data sets can be viewed in the Annual Report on Water Quality at the link http://www.fairfaxwater.org/water/water.htm

[6] Lowest Level of Instrument Detection for Sulfamethoxazole changed to 0.001 ppb starting December 2009 data

Additional information about water quality can be viewed at http://www.fairfaxwater.org/water/index.htm.

updated 03/02/2011

List of Emerging Compounds Studied in Current Testing Effort

Table 3

Compound	Common Description	EPA Regulated for Drinking Water Standards	EPA Maximum Contaminant Level
17b-estradiol	Natural human hormone	No	
Atrazine	Herbicide	Yes	3 ppb
Bisphenol A	Used as an intermediate in manufacture of plastics and resins	No	
Butylbenzyl phthalate	Plasticizer	No	
Caffeine	Stimulant	No	
Carbamazepine	Anti-epileptic pharmaceutical	No	
DEHP [di(2-ethylhexyl)phthalate]	Plasticizer	No	
Dibutyl phthalate	Plasticizer	No	
Estrone	Natural human hormone	No	
Ethynyl estradiol	Synthetic estrogenic pharmaceutical	No	
Ibuprofen	Anti-inflammatory pharmaceutical	No	
Lindane (BHC-gamma)	Insecticide	Yes	0.2 ppb
Linuron	Herbicide	No	
Methoxychlor	Pesticide	Yes	40 ppb
Monensin	Antibiotic	No	
Naproxen	Anti-inflammatory pharmaceutical	No	
Nonylphenol	Used as an intermediate in manufacture of chemicals	No	
Octylphenol	Used as an intermediate in manufacture of chemicals	No	
Progesterone*	Natural human hormone	No	
Sulfamethoxazole	Antibacterial antibiotic	No	

*added to list in Dec 08

Sheet1 Sheet2 Sheet3