

Appendix E: 2017 Survey - PPCP and Hormones in Surface Water to Contaminants of Emerging Concern in the Tidal Delaware River Pilot Monitoring Survey

Sample collection followed the protocols identified in Ambient Water Monitoring of the Delaware River for Emerging Contaminants Quality Assurance Project Plan (QAPP) 2007. Surface water was sampled at six sites (Table E1) on September 25, 2017 by grab samples collected directly into 2 - 1L amber glass bottles with a weighted bottle holder. SGS-AXYS purified water was used for field blanks. Sample bottles were shipped to SGS-AXYS and water was analyzed by Method 1696 MLA-075 LC-MS/MS, List 1-5 PPCP plus hormones (Table E2 to E4). Compounds from 2007 to 2017 PPCP surveys that are included in the USEPA Water Quality Exchange (WQX) characteristics list can also be downloaded through the Water Quality Portal (WQP) <https://www.waterqualitydata.us/>

Table E1. 2017 Sampling Sites

Site	RIVER MILE	DRBC ZONE	SITE DESCRIPTION	LATITUDE (dd.ddddd)	LONGITUDE (dd.ddddd)
E4	68	5	S. of De. Memorial Bridge	39.65472	75.54667
E7	80	4	Opposite Mouth of Marcus Hook Creek	39.81336	75.39058
E9	90	4	South of Schuylkill River	39.875905	75.195988
E12	105	3	Mouth of Pennsauken Creek	39.99478	75.05978
E14	115	2	South of Neshaminy Creek	40.07053	74.92750
E16	131	2	Biles Channel	40.181560	74.745050

Table E2. PPCP in ambient water - 2017

Compound	Concentration (ng/L) by Site/River Mile					
	E4/68.1	E7/80	E9/90	E12/105.4	E14/115	E16/131.1
Acetaminophen	ND	ND	ND	ND	ND	ND
Albuterol	0.345	0.821	1.07	0.357	ND	ND
Alprazolam	0.376	0.644	0.686	ND	ND	ND
Amitriptyline	ND	ND	ND	ND	ND	ND
Amphetamine	62.7	1.76	ND	ND	ND	ND
Atenolol	9.91	20.9	24.3	5.08	5.61	2.85
Azithromycin	ND	ND	ND	ND	ND	9.37
Benzoyllecgonine	11.9	19.2	28.1	5.69	5.98	5.13
Caffeine	23.8	45.5	89.8	120	81.8	39.9
Carbadox	ND	ND	ND	ND	ND	ND
Carbamazepine	21.6	22.3	24.8	13.3	14.2	13.8
Clarithromycin	ND	ND	1.47	ND	1.64	ND
Cocaine	ND	ND	0.898	0.163	0.176	0.383
Codeine	25.3	ND	4.69	ND	ND	ND
Cotinine	5.36	12.6	26.5	8.24	6.47	5.54
DEET	20	36.8	58.9	24.5	27.3	24.7
Dehydronifedipine	0.732	1.37	0.809	ND	ND	ND
Desmethyldiltiazem	0.561	0.928	2	0.624	0.864	0.673
Diltiazem	1.31	3.58	7.35	2.25	3.07	2.48
Dimethylxanthine	ND	ND	89.3	ND	ND	ND
Diphenhydramine	ND	ND	2.06	2.29	2.55	6.89
Enalapril	ND	ND	ND	ND	ND	ND
Erythromycin-H2O	3.01	3.74	4.48	2.68	3.55	2.98
Fluoxetine	ND	ND	ND	ND	ND	ND
Fluticasone propionate	ND	ND	ND	ND	ND	ND
Gemfibrozil	3.22	5.29	16.7	5.66	6.58	6.15
Hydrocodone	14.2	6.21	3.91	ND	ND	ND
10-hydroxy-amitriptyline	ND	0.278	0.402	0.219	0.344	0.286
2-Hydroxy-ibuprofen	ND	129	281	ND	83.4	ND
Ibuprofen	ND	ND	30.4	ND	ND	ND
Lincomycin	ND	ND	ND	ND	ND	ND
Meprobamate	17.8	18.4	21	9	9.87	ND
Metformin	513	824	1280	431	352	300
Methylprednisolone	ND	ND	ND	ND	ND	ND
Metoprolol	21.6	33.9	48.3	17.1	18.9	9.58
Naproxen	5.63	10.2	38.6	21.4	21.5	10.9
Norfloxacin	32.5	ND	ND	ND	ND	ND
Norverapamil	ND	ND	ND	ND	ND	ND
Ofloxacin	ND	ND	ND	ND	ND	2.51

Table E2 (continued). PPCP in ambient water – 2017

	Concentration (ng/L) by Site/River Mile					
Compound	E4/68.1	E7/80	E9/90	E12/105.4	E14/115	E16/131.1
Oxycodone	125	20.6	15.7	4.24	3.19	2.09
Propoxyphene	ND	ND	ND	ND	ND	ND
Ranitidine	ND	0.85	0.951	0.726	0.788	0.761
Sertraline	ND	ND	0.821	ND	0.459	0.504
Sulfadiazine	ND	ND	ND	ND	ND	ND
Sulfadimethoxine	ND	ND	ND	ND	ND	ND
Sulfamethoxazole	75.9	88.2	90.4	38.4	34.4	22
Sulfanilamide	ND	ND	ND	ND	ND	ND
Sulfathiazole	ND	ND	ND	ND	ND	ND
Theophylline	117	103	125	83.7	100	ND
Thiabendazole	ND	ND	1.51	ND	ND	ND
Triamterene	1.22	2.55	4.34	1.9	1.57	1.86
Triclocarban	ND	ND	ND	ND	ND	ND
Trimethoprim	ND	8.7	14.7	3.33	4.46	3.45
Valsartan	25.2	45.4	85	55.2	63.3	43.9
Verapamil	ND	ND	ND	ND	ND	0.383

Table E3. PPCP Analytes and Estimated Detection Limit (EDL) - 2017

Compound	EDL	UNITS	Compound	EDL	UNITS
1,7-Dimethylxanthine	59.2	ng/L	Sertraline	0.515	ng/L
10-hydroxy-amitriptyline	0.229	ng/L	Sulfadiazine	1.48	ng/L
2-Hydroxy-ibuprofen	78.9	ng/L	Sulfadimethoxine	0.464	ng/L
Acetaminophen	14.8	ng/L	Sulfamethoxazole	0.68	ng/L
Albuterol	0.301	ng/L	Sulfanilamide	14.8	ng/L
Alprazolam	0.296	ng/L	Sulfathiazole	1.48	ng/L
Amitriptyline	0.419	ng/L	Theophylline	59.2	ng/L
Amphetamine	1.51	ng/L	Thiabendazole	1.48	ng/L
Atenolol	2.01	ng/L	Triamterene	0.301	ng/L
Azithromycin	2.3	ng/L	Triclocarban	2.96	ng/L
Benzoyllecgonine	0.296	ng/L	Trimethoprim	1.48	ng/L
Caffeine	14.8	ng/L	Valsartan	3.95	ng/L
Carbadox	1.48	ng/L	Verapamil	0.148	ng/L
Carbamazepine	1.48	ng/L	Gemfibrozil	1.48	ng/L
Clarithromycin	1.48	ng/L	Hydrocodone	1.51	ng/L
Cocaine	0.148	ng/L	Ibuprofen	14.8	ng/L
Codeine	3.01	ng/L	Lincomycin	2.96	ng/L
Cotinine	1.51	ng/L	Meprobamate	3.95	ng/L
DEET	0.789	ng/L	Metformin	11.4	ng/L
Dehydronifedipine	0.884	ng/L	Methylprednisolone	3.95	ng/L
Desmethyldiltiazem	0.243	ng/L	Metoprolol	12.6	ng/L
Diltiazem	0.296	ng/L	Naproxen	3.23	ng/L
Diphenhydramine	0.592	ng/L	Norfloxacin	29.4	ng/L
Enalapril	0.301	ng/L	Norverapamil	0.148	ng/L
Erythromycin-H2O	2.27	ng/L	Ofloxacin	3.02	ng/L
Fluoxetine	1.48	ng/L	Oxycodone	1.26	ng/L
Fluticasone propionate	3	ng/L	Propoxyphene	0.296	ng/L
Ranitidine	0.731	ng/L			

Table E4. Hormones in Ambient Water - 2017

Compound	Concentration (ng/L)	EDL (ng/L)
17 alpha-Dihydroequilin	ND	3.95
17 alpha-Estradiol	ND	3.95
17 alpha-Ethinyl-Estradiol	ND	4.93
17 beta-Estradiol	ND	3.95
Allyl Trenbolone	ND	0.45
Androstenedione	ND	1.97
Androsterone	ND	37.7
D4-17 alpha-Ethinyl-Estradiol	104	ND
D4-17 beta-Estradiol	129	ND
D6-Norethindrone	188	ND
D6-Norgestrel	186	ND
D9-Progesterone	191	ND
Desogestrel	ND	341
Equilenin	ND	0.789
Equilin	ND	7.89
Estriol	ND	29.8
Estrone	ND	3.95
Mestranol	ND	19.7
Norethindrone	ND	3.95
Norgestrel	ND	3.95
Progesterone	ND	0.789
Testosterone	ND	0.789